ECHNOLOGY DEPT

Gas Journal

VOL. 291. 109th YEAR. LONDON, JULY 17, 1957. No. 4905. PRICE 1/6

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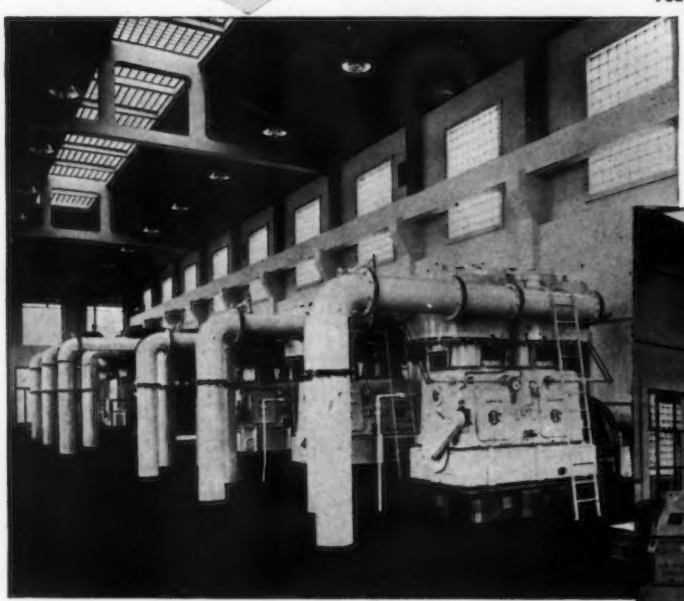
The Compressor House at Partington, Manchester Group of the N.W.G.B., holding six complete sets of Gas Compressors. Each machine driven through speed reduction gear units arranged through gas tight wall glands



BASE YOUR DECISION ON APPLIED EXPERIENCE AND EFFICIENCY

Photographs by courtesy of N.W.G.B.

Illustrations show the interior of the Compressor House comprising:
3 – Gas Compressors – 22½" dia. x 12" stroke (2 variable speed and 1 constant speed), each capable of 160,000 cu. ft. per hour, running at 325 R.P.M. at 20 lbs. per sq. inch outlet pressure. 3 – 37" dia. x 14" stroke (2 variable speed and 1 constant speed), each capable of 500,000 cu. ft. per hour running at 290 R.P.M. at 10 lbs. per sq. inch outlet pressure. 1 – Future machine 26½" dia. x 12" stroke (constant speed), 250,000 cu. ft. per hour running at 325 R.P.M. at 10 lbs. per sq. inch outlet pressure.

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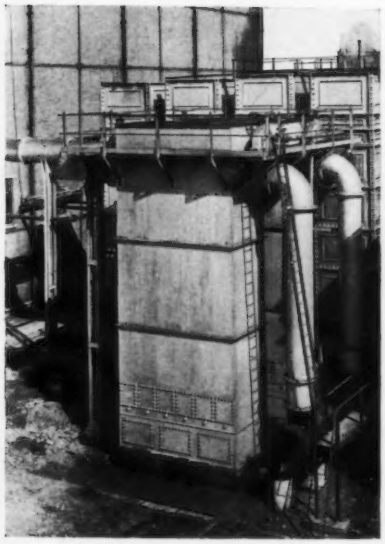

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FOR THE GAS INDUSTRY
The material offered is our own manufacture, and is of the following composition:—
Moisture ... ... 38% (loss on heating at 212 F)
63%-65% (Total iron calculated as $Fe_2O_3.3H_2O$ on the dry basis)
The following allowances will be made in the case of any deviation from the above specification:—
For each complete 1% Moisture in excess of 38% 6d. per ton allowance.
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We were at a loss with our **corrosion troubles**

No need to tell you that corrosion is costly ; it was eating away our profit as well as our plant. Then at last we found a positive answer . . . "EPIMAC" Primers and Finishes.

"EPIMAC" gives standards of adhesion, hardness, durability and chemical resistance never before attained and which have been proved unequalled against marine conditions. Test "EPIMAC" Finishes for yourself and see. And if you're a sceptic, let me say that *we* thought there was no answer to corrosion . . .

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Full details from :

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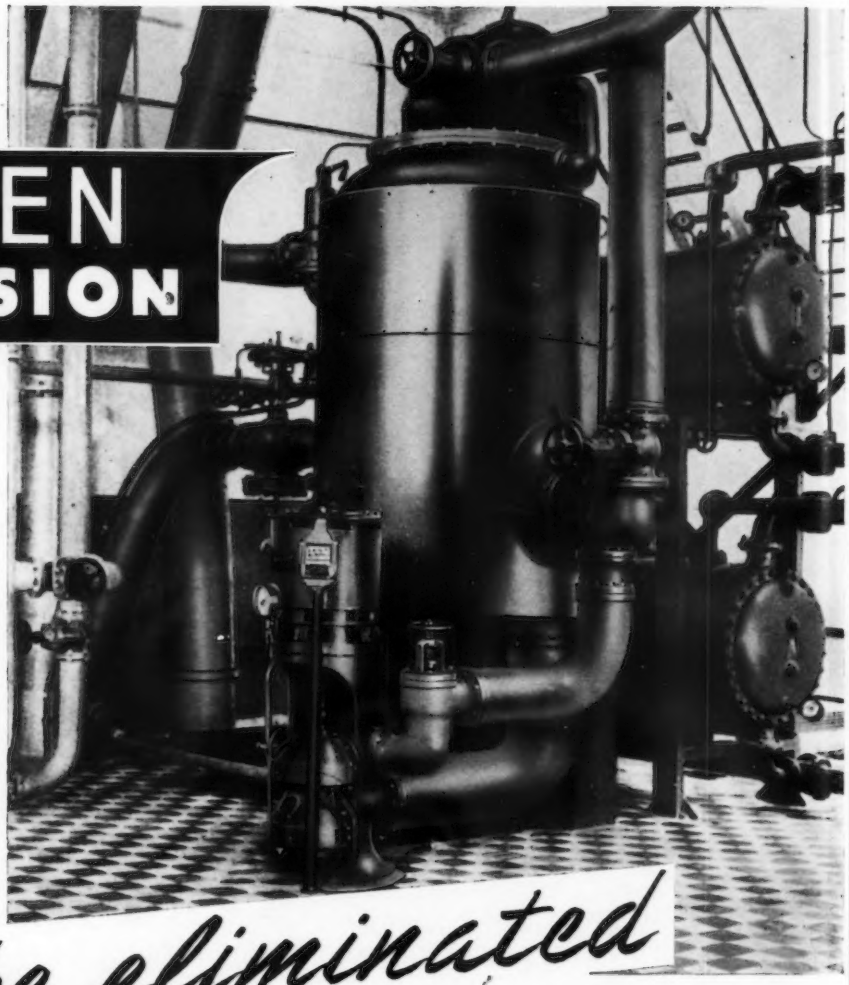

can be eliminated

WITH THE WEIR "OPTIMUM" DE-AERATOR which is the simplest and most effective equipment for removing corrosive gases dissolved in boiler feed water, and so protecting boiler surfaces, piping, economisers, etc., from corrosion and pitting. The Weir De-aerator can readily be installed in existing power plants, and heat in the operating steam is retained in the feed water.

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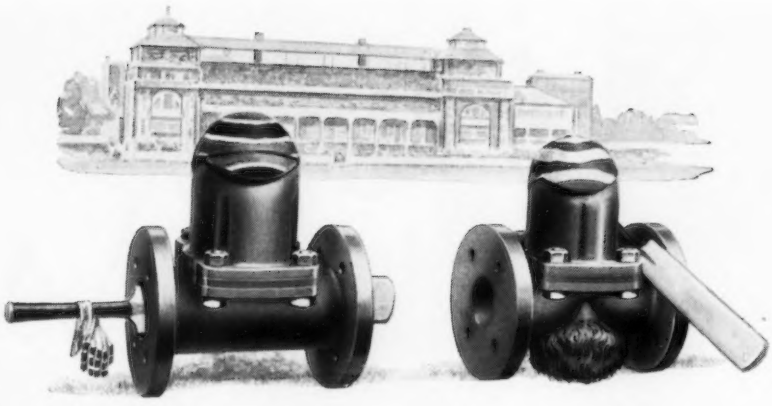
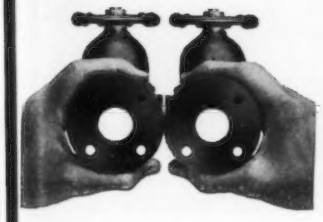
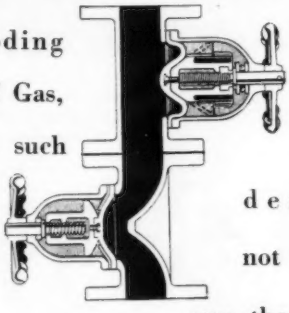


England's opening (and closing) pair

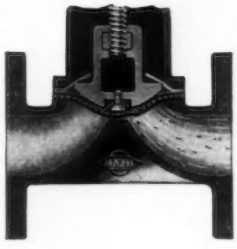


Selected for their mastery of fluid attack whether the corroding speed of Acids, the deceptive spin of Gas, the wearing length of Abrasives or such unpredictable 'chinamen' as $FeSO_4$ and $(CHOH\ COOH_2.)$



Saunders (K), with straightbore, plays viscous fluids with Jessopian ease and, even when sticky fluids "close in", speedily reopens the game by rodding through.

Saunders (A), that G.O.M. of fluid control, scores all round the wicket. Runs flow from that streamline bore with negligible resistance and, should defence be demanded, not a drop will pass the flexible diaphragm even though grit or small solids should assist the attack.



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If you wish to know how many hundreds of applications stand to the credit of Saunders A and Saunders K look it up in the engineer's Wisden—Saunders Technical Handbook.

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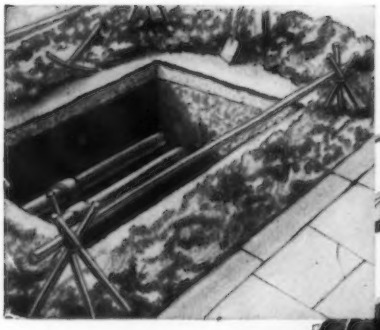

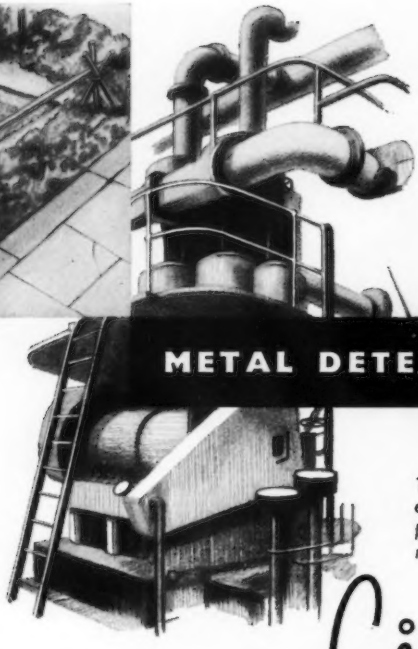

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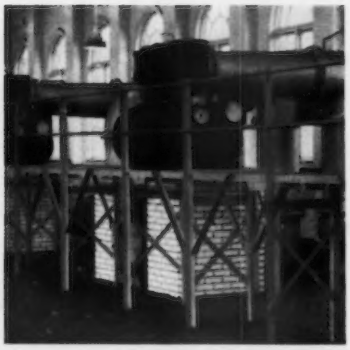

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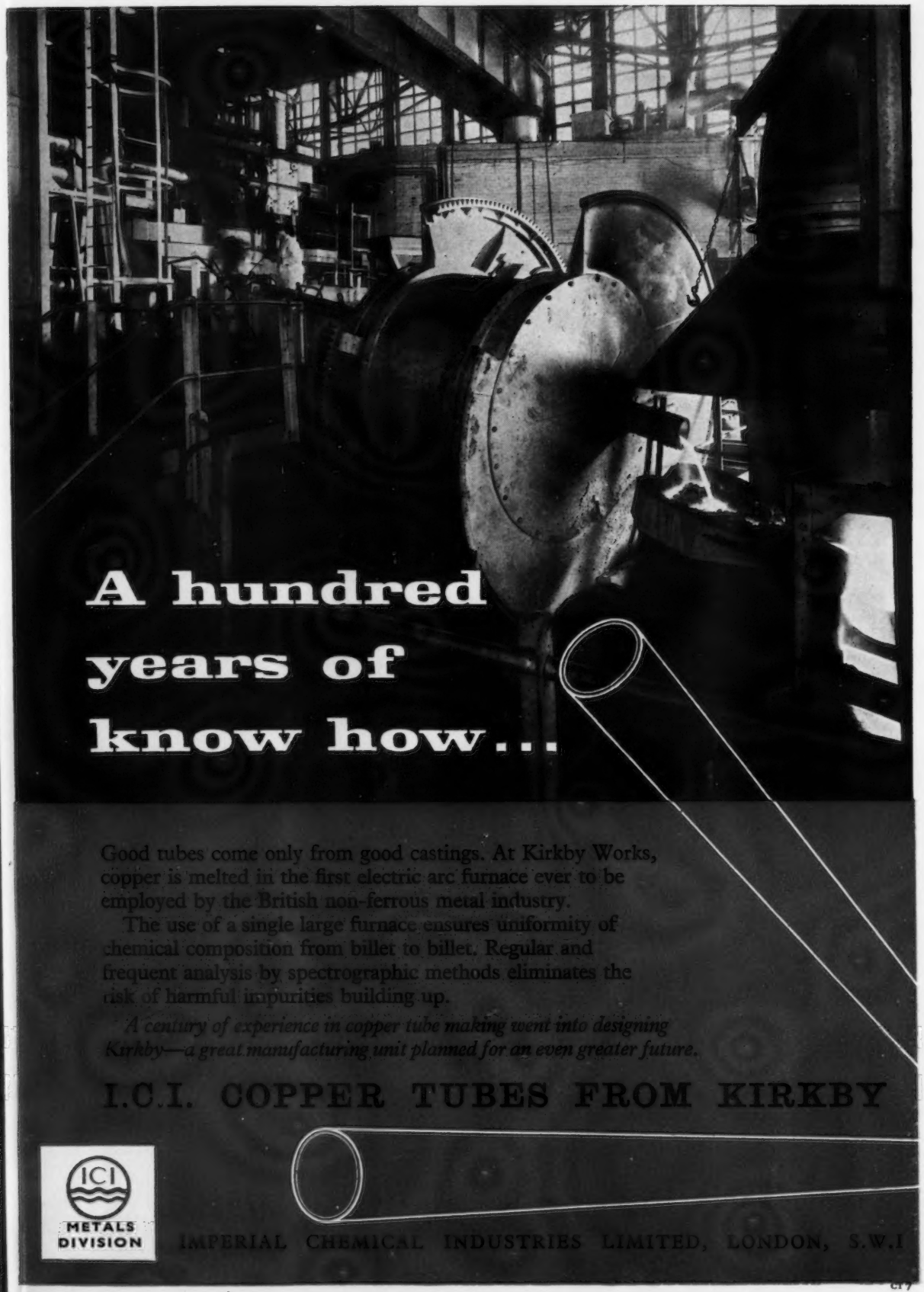
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The use of a single large furnace ensures uniformity of chemical composition from billet to billet. Regular and frequent analysis by spectrographic methods eliminates the risk of harmful impurities building up.
A century of experience in copper tube making went into designing Kirkby—a great manufacturing unit planned for an even greater future.
I.C.I. COPPER TUBES FROM KIRKBY
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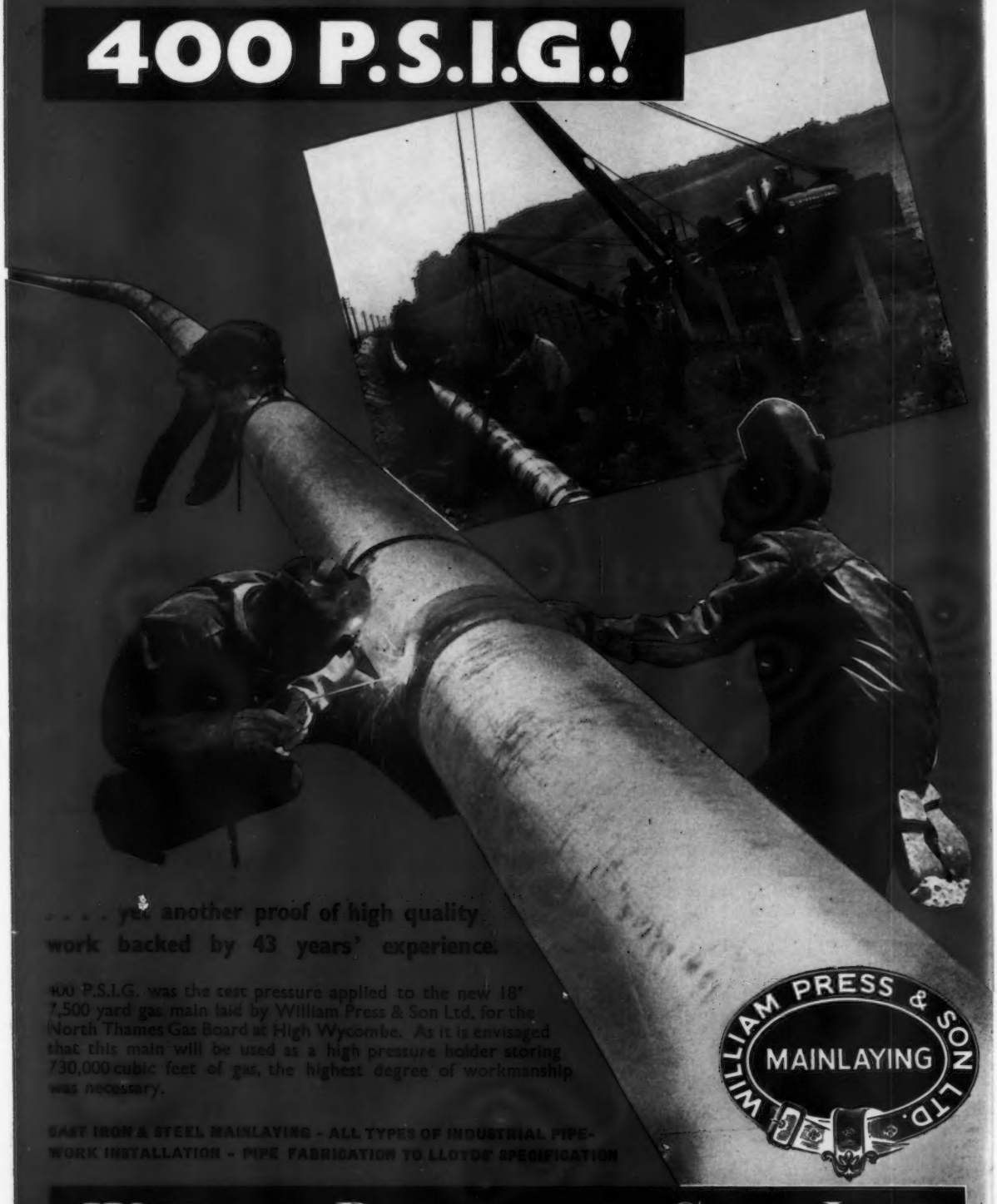

. . . . yet another proof of high quality work backed by 43 years' experience.

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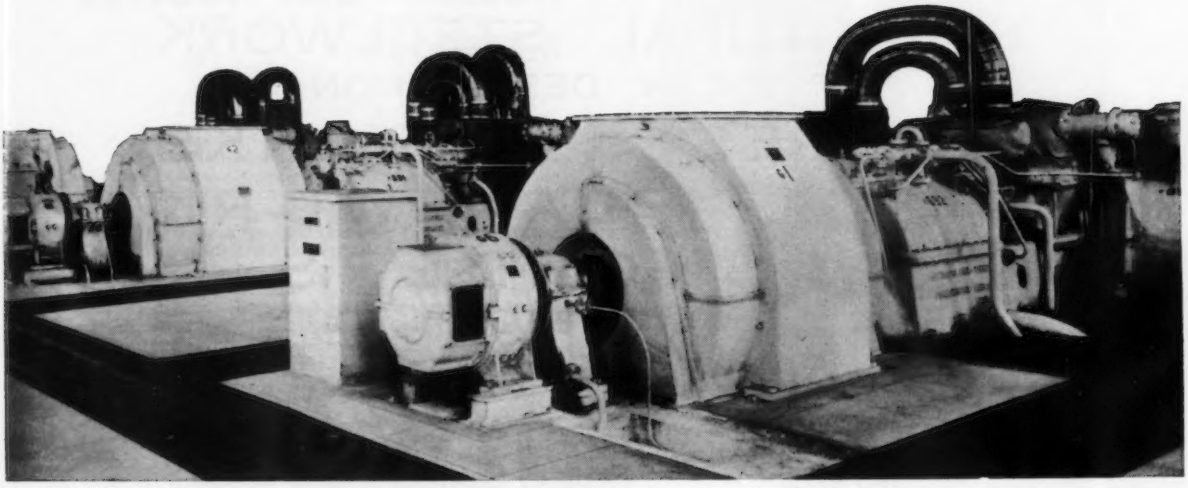

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By adopting Metropolitan-Vickers pass-out turbo-generator sets, many industrial organisations using steam for processes or heating have found it economical to generate electrical power at little additional fuel cost. The company produces condensing and pass-out turbo-sets from 250 to 5000 kW AC or DC. These small power sets have been adopted in paper mills, plastics manufacture, textile production, public utilities, chemical and oil plants throughout the world. Please write for publication 7452/1.

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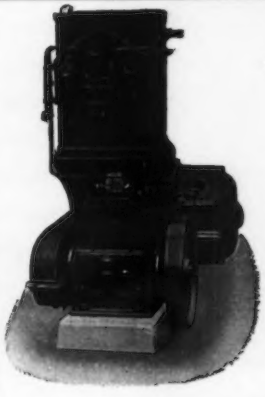

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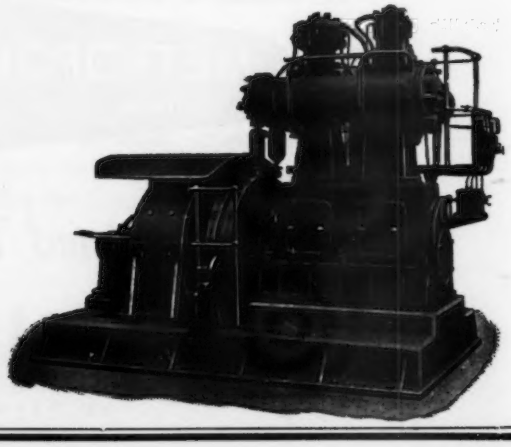
pressures up to 5,000 lbs. per sq. in.

The illustrations show two high pressure gas compressors. As specialists in the design and manufacture of compressors for both air and gases, we make compressors for a wide range of capacity and pressure up to 5000 lbs. per sq. inch.

The compressor shown above has a capacity of 25 cu. ft. of free hydrogen per minute compressed to 3000 lbs./sq. inch. The illustration on the right shows a four-stage compressor with a delivered capacity of 200 cu. ft. of free town's gas per minute compressed to 5000 lbs. per sq. inch.



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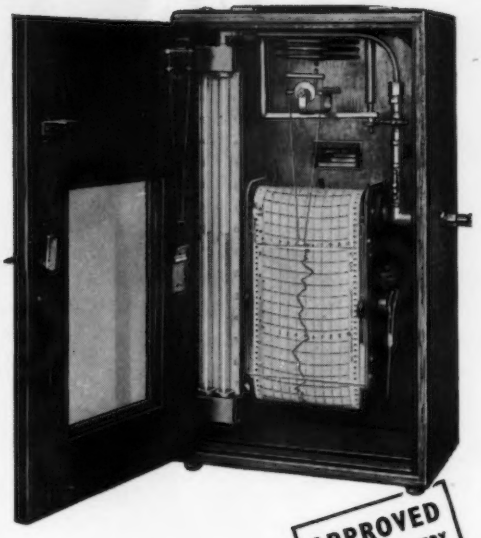

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Photograph by courtesy of National Coal Board

for a complete Track Service

Photograph by courtesy of National Coal Board

Work begins at Cadeby: The National Coal Board again entrusts the Eagre Construction Co. Ltd. with a similar project. Earthworks, Drainage, Track Laying and ancillary works for thirteen miles of Sidings are now in progress at Cadeby Main.

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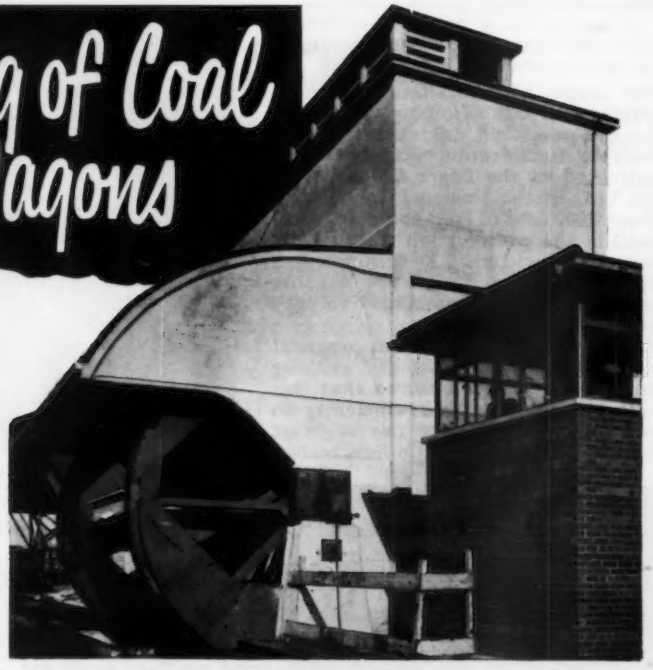
Dustless tipping of Coal from Railway Wagons



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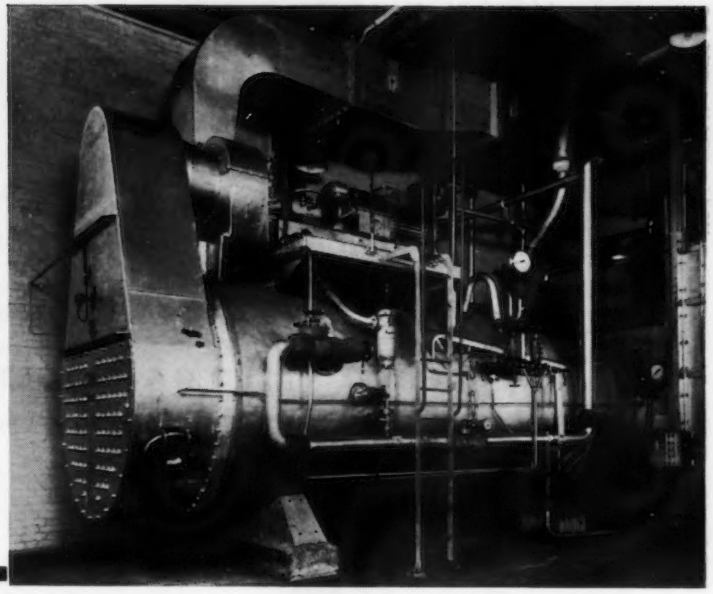
IN THE

Gas Industry



One of the Waste Heat Boilers in the Glover-West installation at the Dumbarton Gas Works

Photograph by courtesy of the Scottish Gas Board

consult the specialists in waste heat recovery

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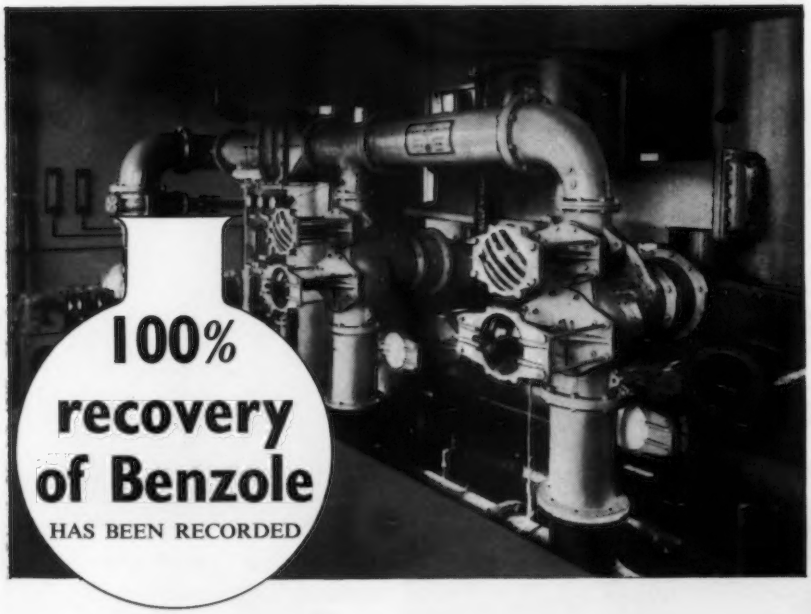

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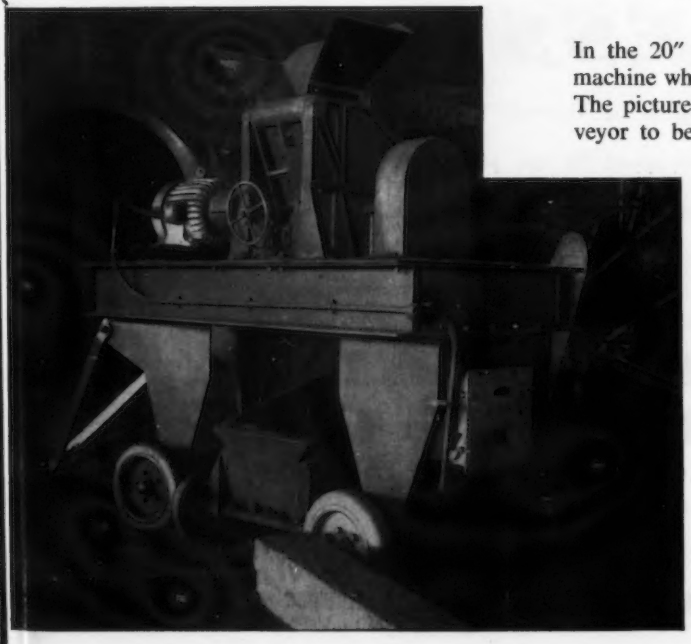

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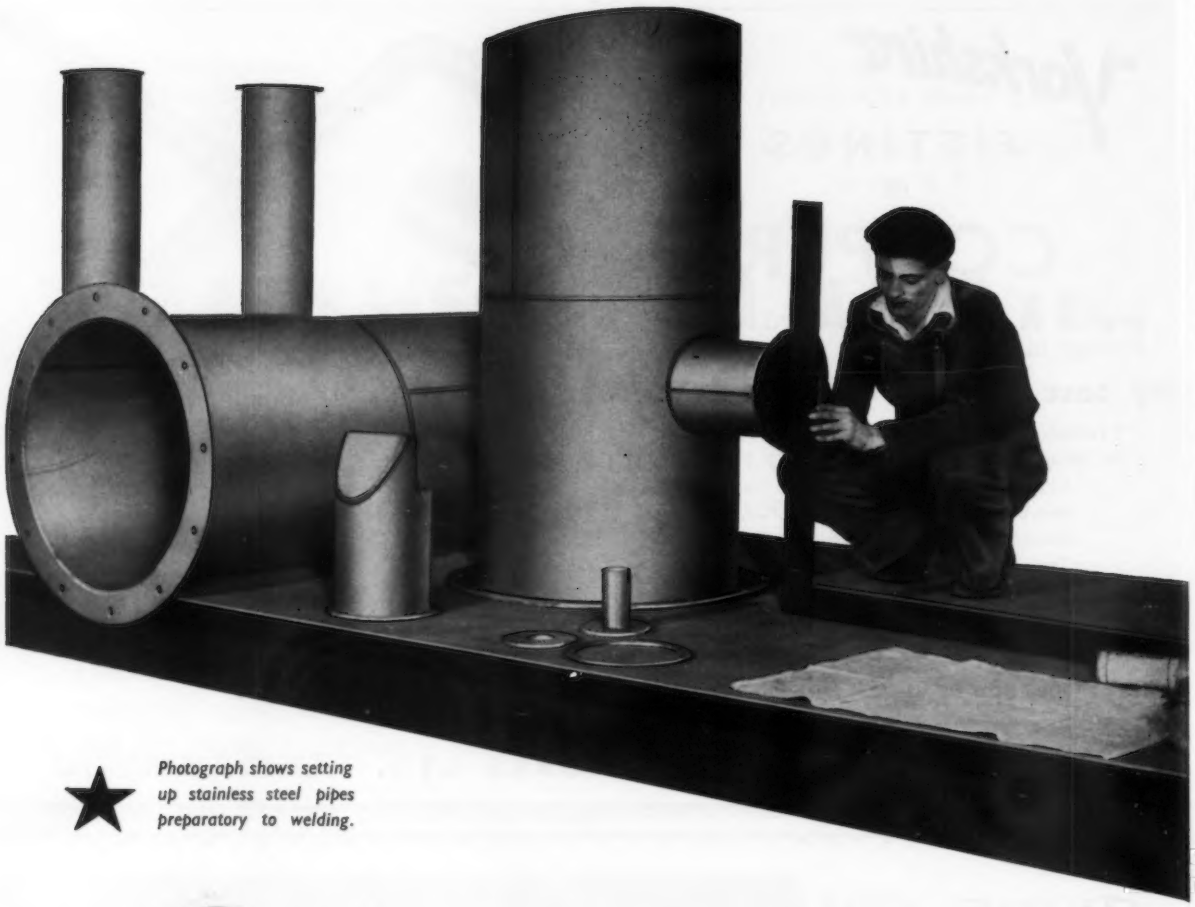

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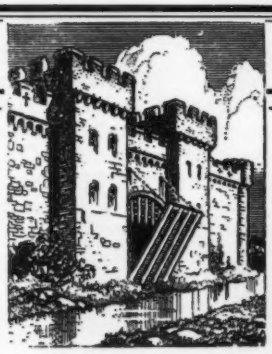

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Gas Journal

VOL. 291 NO. 4905 July 17, 1957

109TH YEAR

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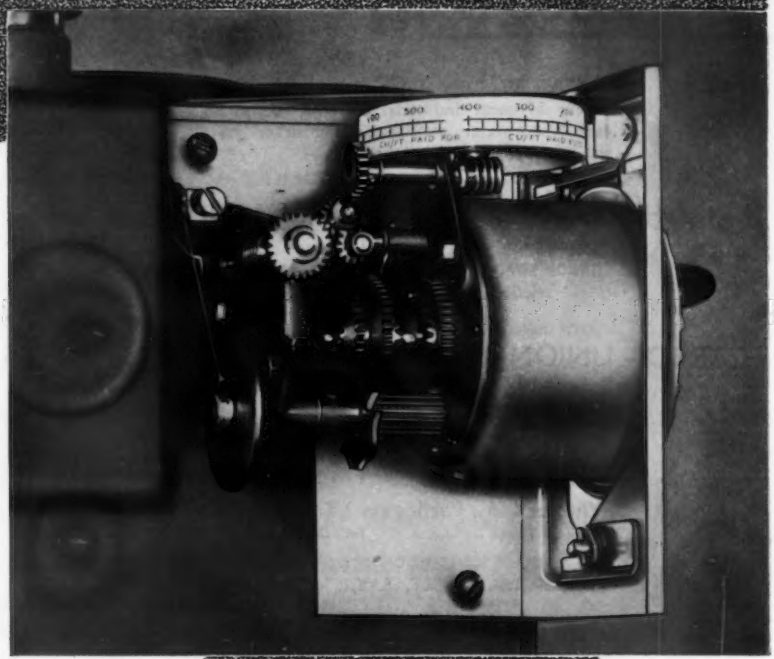

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Gas Journal

VOLUME 291. No. 4905. JULY 17, 1957. 109th YEAR

Keeping Faith with the Contractors

A SHORT while ago we commented on the extraordinarily close connection and interdependence existing between the gas industry and the makers. At that time we were referring in particular to the appliance manufacturers who, we suggested, might seek new markets if gas boards did not co-operate fully in combating the difficult competitive conditions with which we are faced. A relationship no less cordial and intimate has existed between the gas industry and the builders of gas-making plant, but here the process of 'growing apart' has become considerably more pronounced. Few of the major plant contractors have not sought to compensate for the anticipated fall in gas business by building up a connection in other industries. With the rapid progress of integration and the prospect of an industry based on a small number of major works, it is abundantly clear that the scope for selling carbonising and purification plant must be reduced. A move towards the establishment of new business in the chemical, oil, nuclear energy, and other fields has therefore become a sensible and necessary safeguard.

Many of these contractors who are thus casting their net in a wider sea have grown up with the gas industry and will probably keep for it a special affection and interest. But even so their feelings must be tempered by common sense. These companies are for the most part specialists whose knowledge of particular processes is almost certainly unequalled by engineers in the industry—a fact which is not surprising when one considers the number of similar plants with which they are concerned, not only in this country, but probably abroad as well. The expert knowledge thus acquired over many years of development under diverse conditions has for us a very special value; it is in fact irreplaceable. That wealth of experience and determination to help will continue to be available to us as long as gas boards continue to purchase plant marketed by the contractor as the best possible design of which he is capable. The only circumstances under which that collaboration *may* not be available are those existing when the contractor is not in fact selling a plant of his own design but one built to the customer's specification. It is surely no reflection on the contractor's keen sense of service to the industry and his genuine desire to help (often based on close personal friendships between contractor and board) to suggest that when a plant is fabricated to the customer's design the responsibility for ensuring that it operates satisfactorily rests primarily with the purchaser. Under such circumstances there might be a tendency for boards to regard these old-established and highly specialised makers as mere 'ironmongers,' or even to place their business with other engineers outside the field altogether.

This possible danger of 'blue-printing' the contractors was recognised shortly after nationalisation and was the subject of editorials in the Technical Press. The point is—to what extent have these fears been realised? Happily things have not deteriorated to the extent once envisaged. There may be two principal reasons for this: The publicity given to the danger and the efforts made to overcome it, such as the creation of the Joint Consultative Committee of the Gas Council and the Society of British Gas Industries; and the fact that by no means all the plants built to boards' specifications have been a complete success. There is some evidence that certain gas board engineers have come to recognise the fact that maybe the contractors knew best after all!

There is another aspect of this basic relationship between maker and board which is worthy of mention. A specialist contractor has the facilities to make his specialities expertly and economically and employs an experienced staff of designers, engineers, and workmen. An essential part of the economics of such a company is the employment of expert workmen for plant erection and removal. Today, however, it sometimes happens

that a gas board will decide to use its own employees when, for example, an item of plant is to be moved from one works to another, or even to a different site on the same works. Presumably the reason for this is the board's belief that by employing their own men the work can be done more cheaply. If this is indeed a fact and is not merely one of those tricks of costs juggling which are sometimes a feature of works accounting in these days, the board can hardly be criticised; it is merely fulfilling its proper function as set out in the Gas Act. But at the same time it is worth remembering that contractors have the men to do such work and they are unlikely to react very favourably to being called in afterwards in order to adjust the plant or diagnose some unexpected ailment!

Another criticism which is sometimes made is that although most contractors are fully prepared to spend considerable time and money on making the enquiries, and even experiments, necessary before tendering, the industry appears largely unaware of the extent of that expenditure (which may amount to several hundred pounds) and of the time it takes to make the necessary investigations and calculations. The drain on the contractors' resources when an enquiry is set to ten or more firms can be imagined, and it not infrequently happens in such cases that the customer will only seriously consider three of them, irrespective of price. And even if only three contractors are concerned, the successful tender must carry the cost of the two unsuccessful ones—a point which sometimes seems to be overlooked by the customer.

There are many other similar matters which might be enumerated if space permitted. However, although we appear to have digressed somewhat, our theme is this—that although many of the makers traditionally associated with the gas industry are seeking other outlets for their business, a basic and essential part of our future prosperity will depend on their technical development and on the continuance of that friendly and co-operative relationship which has been so mutually beneficial in the past. Accordingly, although we certainly must not reach a stage at which the makers can be said to call the tune, we must nevertheless shape our policy in such a way that we extract the maximum from their wealth of knowledge and, as far as possible, encourage them to regard the gas industry as no less reasonable and rewarding an industry to serve than in years past.

Selling to Industry

SELLING, which was once regarded (at best) as an art, is now very much a science. Far from being a haphazard affair in which success is solely dependent on personal persuasiveness, selling today is a cold, calculated business in which every stage is planned like a military operation. An example of how seriously the subject may be tackled, without once slipping into professional jargon or abstruse technicalities, is given by a report just published by the British Institute of Management. Entitled *Selling to Industry* (5s. from the B.I.M., Management House, 80, Fetter Lane, London, E.C.4), this is based on the discussions of a study group drawn from members of medium size and large companies to study the problems involved in marketing industrial goods. The group was composed of senior executives from companies in the following industries: Gas, structural engineering, steam generating equipment, printing machinery, chemicals, steel, sugar, weighing equipment, electrical engineering, mechanical handling, building and engineering supplies, office equipment and packaging. The executive from the gas industry was also the official representative of the Purchasing Officers' Association. 'It soon emerged,' says the introduction to the report, 'that there is a surprising amount of common ground. An initial reaction, that the problems of the various industries in the group were too different to allow useful comparison, quickly disappeared.'

In view of the need for accuracy in planning industrial sales, the group considers that more emphasis should be given to the functioning of the marketing division as an intelligence centre where information from all sources is collected, analysed and translated into programmes. 'In forecasting,' it reports, 'the industrial goods manufacturer is primarily concerned with the future of the industries that he supplies. Companies manufacturing such diverse products as office supplies, electrical equipment, chemicals, containers and mechanical handling equipment all produce a five-year forecast in detail. Two members of the group prepare a forecast up to 20 years ahead. This is used as a guide by top management in long-term planning.'

Reading through this lucid and sensible report one naturally looks for suggestions and techniques which may be of service to the gas industry, but one is forced to the reluctant conclusion that in a number of respects this differs from many other businesses. That the gas industry is 'different' has been a familiar cry for many years and in general we have fought against this glib refusal to be judged by common standards. In this case, however, there are many respects in which there is no clear similarity between the sale of, say, office equipment or sugar and the type of service offered by gas. However, there are sections where the aptness and application are only too obvious. Such a section is that devoted to the training of salesmen.

The group notes that the main differences between training for industrial goods salesmen and training for consumer goods salesmen lie in the greater degree of technical training required, and the need to ensure that the emphasis on technical efficiency does not obscure the necessity for good salesmanship, and the greater length of the training period. It goes on to discuss the way in which the training programme should be planned. Although it is recognised that industrial salesmen may have to handle high-level contacts and often they must act in the role of technical advisers to customers, the need for technical knowledge must not obscure the need for training in salesmanship. This was emphasised by the purchasing officer from the gas industry who said he had met far too many representatives unable to present their arguments in a clear, logical manner.

'The group believes there is a danger that insufficient emphasis may be given on training in salesmanship, since companies are often primarily concerned with ensuring that their representatives are properly equipped technically. Too often companies rely on their senior salesmen to give practical training to recruits in the art of handling customers. This may frequently be a weak-

ness, unless the senior salesmen themselves have been instructed in how to train men. All too often a good salesman is not adept in instructing others and passing on the reasons for his success.'

This strikes us as making very good sense and we find ourselves wondering just how good our own industrial gas salesmen are at *selling* as opposed to coping with industrialists' problems. While it is true that in general gas is used in industry on its merits as a fuel rather than as a result of 'salesmanship,' industrialists who for some reason are prejudiced in favour of a competitive fuel have to be persuaded or 'sold' the idea of trying gas. And that requires more than mere technical knowledge of process and price—it requires salesmanship.

The Birth of the Chemical Industry

THE chemical industry as we know it today may be said to have been born with the setting up of a synthetic dyestuffs factory by William Henry Perkin near Harrow in 1857. Until then it had been supposed that the natural substances used for dyeing, which were extracted from vegetable and animal sources, could not be obtained by any other means. Organic chamistry was in its infancy, in fact the foundations for an organised system based on entirely reliable experimental work had hardly been laid. The molecular and atomic theories of matter had only lately been confirmed by the resurrection of Avogadro's hypothesis by his old pupil Canizzaro, and all the hazy but often inspired suggestions put forward by some of the most brilliant chemists of the day to account for the facts as shown by individual experiments, were cleared away and definite, firm foundations on which future research work could be based, were laid.

Perkin had discovered his first dyestuff, mauvene, while trying to make quinine from aniline, and had been clever enough to realise that he had made something of value which could be exploited. This substance and its properties as a dyestuff he submitted to a firm of dyers which confirmed what Perkin already new and advised him to start making it on a commercial scale. Perkin opened his factory at the age of 18 in the later part of 1857.

His factory manufactured substances that had never before been made artificially. Hitherto the chemical industry had manufactured inorganic substances of mineral origin, and the processes were carried out by rule of thumb, and changes in the process only were made as a result of an observation by someone working in the factory, or compelled by the enactment of legislation to do away with harmful fumes spreading over the countryside.

In the new factory new substances were being experimented with and eventually manufactured as a result of Perkin's researches and experiments. His raw materials such as benzene, naphthalene and anthracene were obtainable from coal tar, the only source of which was the gasworks, since the by-product coke oven did not make its appearance until nearly 30 years later. Perkin's brother toured the gasworks to instruct the gasworks personnel on how to obtain these substances more easily and in purer form from their crude tars.

After the Franco-Prussian war, the Germans began to take a great interest in organic chemical manufacture and realised the enormous importance of research into the structure of commonly used organic substances and the best means of synthesis on a commercial scale. Perkin, now in his middle thirties, saw that competition from the Continent would hit him very hard; he sold out his interest and retired, a rich man, to concentrate on pure chemical research.

This was a tragedy for the chemical industry and this country very soon lost its lead to the Germans, who proceeded to monopolise the manufacture of dyestuffs in Europe and buy up all the coal tar from all sources in Britain, going so far as to build by-product coking plants in Great Britain free of charge, to use otherwise unwanted coking slacks, provided they in turn could demand all the by-products in payment for the plant. This was the situation at the outbreak of the 1914 war.

Great Britain, with her overseas possessions, has always had an interest in industries in those possessions and the growing of the various crops to produce the various dyestuffs were important industries. Indigo in particular was of importance in India, and madder, from which alizarene to make Turkey Red is extracted was grown in other parts of Asia. The manufacture of the synthetic product would make a considerable difference to the prosperity of these crops, so it is perhaps not surprising if this country was slow to make such great changes in her chemical industry. It was, however, forced upon her with the discovery of synthetic indigo by the Germans in the eighties, and finally by the painful experience of our dependence on Germany at the outbreak of the first world war for a number of important chemicals.

Since then the chemical industry in this country has gone forward to equal, if not to surpass, I.G. Farbenindustri, the great dyestuff trust in Germany and the large chemical manufacturing firms in America. This has only been possible by constant research into new ways of manufacture and constantly testing the properties of the substances being discovered by research. As with mauvene, Perkin found something he was not looking for, but intuition made him realise that here was something he could use and develop, so also with the many substances which are being discovered almost daily in laboratories all over the world. Today this is a commonplace and our ever-rising standards of life are always creating a demand for such products, so that even if the natural sources were still available, they could never hope to supply the amounts needed.

All this is the result of pure scientific study.

Company Forms New Subsidiary

A NEW subsidiary company, West's (Manchester), Ltd., has been formed by West's Gas Improvement Co., Ltd., Albion Ironworks, Miles Platting, Manchester, 10.

The new company will deal with activities outside the gas industry which have hitherto been carried on by the parent organisation, and will include the production and marketing of screening plant, mechanical handling equipment and coal preparation plant as well as design and manufacture of Flamrich PSH resonance screens, Wemco coal preparation plants and other items in the Wemco range.

The address of the new company will be Norton Street, Miles Platting, Manchester, 10; telephone No. COLlyhurst 2132.

Personal Notes

MR. G. W. EMRYS-ROBERTS has accepted the appointment of Sales Manager of Parkinson & Cowan Gas Meters, and will be joining the Company in that capacity in mid-September. Mr. Emrys-Roberts has been connected with the gas industry for more than 20 years. He joined the Gas Light and Coke Company in 1933 and held a number of appointments with that Company, and later, the North Thames Gas Board. In recent years he has been Technical Secretary of the Gas Council, Watson House Centre, in which capacity he has made wide technical and commercial contacts throughout the industry. He was educated at Stowe, and during the last war served in the Royal Artillery with the rank of major.

MR. E. V. WRIGHT, Secretary of the North Thames Gas Board's Sports Association, who is retiring after 45 years' service in the industry, recently received a silver tea set and tray, specially engraved with the Association's badge and a commemorative inscription from Mr. Brian Wood, Secretary of the Board and Chairman of the Sports Association at the Annual General Meeting of the Association. For Mrs. Wright, who before her marriage worked for the Board at Imperial House, Fulham, there was the presentation of a gold wrist-watch. MR. G. A. FOAT, formerly Assistant Secretary, has been appointed to succeed Mr. Wright, while MR. P. S. BROWN will become Assistant Secretary.

MR. R. B. REYNOLDS, and MR. H. E. ROBINSON, have been appointed Directors of George Wilson Gas Meters, Ltd. Mr. Reynolds has served as an Alternate Director of the Company for over a year, and is Sales Manager for the North of England and for Scotland for both George Wilson Gas Meters Ltd. and Radiant Heating Ltd. Mr. Robinson joined the Board of Directors of Radiant Heating, Ltd., as Technical Director in December, 1952, and was appointed Joint Deputy Managing Director of that Company in May, 1957, a position he will continue to hold.

MR. DAVID L. DICKSON, Fife Group Manager, received a presentation in the Dunfermline showroom from Mr. W. Anderson, Manager, to mark his promotion to the post of Assistant Divisional General Manager for the Central Division of the Scottish Gas Board with headquarters at Perth.

MR. G. MCHARDY left Wailes Dove Bitumastic, Ltd., and has commenced operation as a corrosion consultant with specific reference to pipeline protective measures, operating from 53, Grosvenor Road, Petts Wood, Kent. Telephone: Orpington 25343.

MR. R. A. BARTLEY has been appointed Technical Sales Representative for the North Eastern area, including Northumberland, Durham, Cumberland, and the North Riding of Yorkshire, by Sir W. H. Bailey and Co., Ltd., Patricroft, Manchester.

MR. F. BUCKLAND has been appointed Secretary and Office Manager of United Coke and Chemicals Co., Ltd., and of the ore mining branch of United Steel Companies, of Sheffield, in succession to MR. W. BACON, who has retired after 49 years' service.

MR. PHILIP C. JEFFERY recently received presentations to mark his retirement, due to ill health a year ago, after 46 years' service. This ends a family link with the industry going back more than 100 years.

MR. A. J. C. MACLEOD has been appointed Export Manager and MR. PETER H. JACKSON an Assistant Sales Manager by the Lancashire Dynamo Group.

Chairman's Year of Celebrations

FOR Sir Harold Smith, Chairman of the Gas Council, and his wife, 1957 has been a year of celebrations. The last occasion was almost a double event, for they have just become grandparents for the second time within a month. Patricia, their elder daughter, presented them with a grand-daughter on July 8; and Diana, a grandson on June 12. Both daughters are married to Hampshire farmers.

Then in June, Sir Harold and Lady Smith celebrated 40 years of marriage—their Ruby Wedding Anniversary. They married in the Parish Church of Erdington, Warwickshire, while Sir Harold was serving as an officer in the Royal Field Artillery.

There is one celebration to come later. For Sir Harold has accepted an Honorary Fellowship of the Society of Engineers and will be presented with his scroll at the Society's annual dinner on October 11. This is the highest honour the Society can bestow and is limited to 25 persons.

Sir Harold and Lady Smith live at Cowslade Farm, Hartley Wintney, Hampshire.

Diary

July 22.—WEST MIDLANDS G.C.C.: Committee Room, Gas Offices, Edmund Street, Birmingham 3. 2.30 p.m.

July 29.—EASTERN G.C.C.: Connaught Rooms, Great Queen Street, Kingsway, W.C.2. 2.30 p.m.

TWO BOARDS RAISE THEIR PRICES

Chairmen Blame Costs

GAS prices in the South Western and South Eastern areas are to go up. Announcing a 10% increase from next Monday, Mr. C. H. Chester, Chairman of the South Western Board, said the increase had been forced on the Board by rising prices and the need to provide more money for capital development.

There would be no increase in the standing charges, he added. The effect on the average domestic consumer would amount to about 1d. a day.

The price of the first 30 therms a quarter will be increased by 2½d. or 3d. a therm, depending on the price area, and the domestic running rate by 1½d. a therm. Consumers will receive one more gas bill at the present prices.

The South Eastern flat rate is to go up 2d. a therm from August 12. In certain cases the increase will be only a penny, however. Mr. W. K. Hutchison, Chairman, said yesterday that coal prices had risen since 1955, by nearly 17%. The average consumer would pay about 5d. a week more, and the Board's revenue would rise by about 8%.

Mr. Hutchison added that the Board had taken the opportunity of revising some tariffs and introducing a new one for large domestic users.

Cleanglow Sales Reach New Peak

SALES of 'Cleanglow,' the new smokeless fuel introduced by the North Thames Gas Board last autumn, reached a peak in June, when 2,700 tons were sold in one week. This compares with a peak demand last winter of around 1,000 tons per week.

These sales have been partially influenced by attractive summer prices, the Board believes, but considers them a sure indication that the new fuel has established itself. The Board is making forward contracts which will cover 12 months' production at the present rate.

Long Service Awards

Presentations of wrist-watches to 233 employees with 25 years' service were recently made by Keith Blackman, Ltd. Of these, 165 were made at the Tottenham head office and works by Mr. D. S. Woodley, Chairman and Managing Director; 53 at Arbroath by Mr. W. G. Calder, Director and Works Manager; while the remainder were made to representatives at the various branch offices and London area sales office.

Activities Continue at High Level, says W-D Chairman at A.G.M.

IN the course of his Chairman's address to the annual general meeting of Woodall-Duckham Ltd., recently, Mr. T. Campbell Finlayson said the activities of the Group continued at a high level. The value of the work carried out during 1956 by the operating companies exceeded £14 mill., an increase of approximately £700,000 over 1955. Orders received during 1956 exceeded the value of work carried out with the result that the Group, at the end of 1956, had over £25 mill. of unexecuted work in hand. This means that apart from new orders the Group would be fully employed for the next two years.

Woodall-Duckham Construction Co. Ltd., the principal operating company of the Group, while continuing to serve the industry by the building of gas-making plant, had become increasingly occupied with the provision of carbonising and by-product recovery plants for the steel and coal industries. During the past year contracts for coke oven plants were received from a number of British iron and steel companies, from the South African Iron & Steel Corporation and from the National Coal Board. Plants to a total value exceeding £5½ mill. were under construction in South Africa, while the largest new coke oven plant ever built by the N.C.B. was inaugurated by the then Minister of Fuel and Power at Wingerworth, near Chesterfield.

Effects of Clean Air Act

The gas industry was ever on the look-out for new types of plant which would enable it to provide a cheaper product and Woodall-Duckham Construction Co. Ltd., with a view to assisting in this direction, had just built and put into commission two new forms of gas-making plant, one using non-caking indigenous coal and one using oil, and these are both in successful operation.

The full significance of the Clean Air Act had not yet been felt but it was clear that its implementation would require increased supplies of town gas and solid smokeless fuel. The well known and well tried Woodall-Duckham continuous vertical retort plants were particularly suitable for the production of high quality smokeless fuels and the Company was in the position of being able to supply further plant of this type to the gas industry as the demand for smokeless fuel increased.

The consolidated profit and loss account for 1956 shows a profit before taxation of £1,087,064 compared with £1,042,682 for the previous year. Taxation amounted to £549,455 compared with £558,932 for 1955. Thus after deducting £16,853, the proportion of profits applicable to outside interests, the Group net profit is £520,756 against £464,391.

Out of the Group net profit of £520,756 profits amounting to £306,889 were retained in the subsidiary companies (compared with £246,648 in 1955) and a further sum of £100,000 was set aside for special research and development, leaving a net amount of £113,867 brought into the parent company's accounts.

The preference dividends for the year ended December 31, 1956, have been paid. The directors recommend a final dividend of 20% on the Ordinary shares making with the interim dividend of 5% paid on December 31, 1956, a total of 25%, the same as for 1955.

The special research and development account, for which a total sum of £300,000 (including £100,000 in 1956) has now been set aside was created to provide for expenditure outside the group's normal research and development activities, and to ensure that the Group kept abreast of the changing requirements of the industries it serves. During 1956 expenditure amounting to £92,844 was written off this special account, the amount including the cost of an investment in a specialist company which secured to the Group new gas-making processes already in successful operation abroad, but which have now been successfully developed to meet conditions obtaining in this country.

It was recommended that the authorised capital of the company be increased to £1.9 mill. by the creation of 3.6 mill. new Ordinary shares of 5s. each to rank *pari passu* with the existing Ordinary shares and that £600,000 of the undivided profits of the company be capitalised and that 2.4 mill. new Ordinary shares of 5s. each fully paid up be issued to existing Ordinary shareholders on the basis of one new Ordinary share for each existing Ordinary share held.

The effect of this transaction would be to raise the issued capital of the company to £1.6 mill. comprising £400,000 5% Cumulative Preference shares of £1 each and £1.2 mill. Ordinary capital, represented by 4.8 mill. Ordinary shares of 5s. each. The reason for the creation of the 1.2 mill. Ordinary shares, which would remain unissued after the proposed capitalisation, is to ensure that this additional authorised capital should be readily available for possible future developments.

It was expected to pay a 5% interim and a 15% final dividend on the increased Ordinary capital in respect of the current financial year ending December 31, so that the Ordinary shareholders receive a higher overall return which the directors considered justified by the expansion in the company's business and by the large retentions of profits over the past few years.

Midland Section Visit Stoke-on-Trent

THIS year's summer meeting of the Midland Section of the Institution of Gas Engineers consisted of a visit to the City of Stoke-on-Trent, which embraces the six towns of the County Borough—Stoke, Burslem, Fenton, Longton, Hanley, and Tunstall.

In the morning they visited the Etruria gasworks of the North Staffordshire Division, West Midlands Gas Board, which has increased the sale of the gas to the potteries by 100% since nationalisation, and supplies almost 90% of all gas sold for industrial purposes in the area.

Mr. F. L. Atkin, Chairman of the Midlands Section, presided. Guests included the Lord Mayor, the Reverend Arthur Perry, J.P., who was an engineer before he entered Holy Orders, and the Lady Mayoress; Mr. G. le B. Diamond, C.B.E., chairman, Midlands Gas Board; Mr. R. S. Johnson, M.B.E., Chairman, East Midlands Gas Board, and Mrs. Johnson; Dr. J. Burns, G.M., President, The Institution of Gas Engineers; Alderman J. H. Lewis, O.B.E., and Mrs. Lewis; Mr. R. A. Maddock, O.B.E., and Mrs. Maddock; Mr. D. K. Green, Hon. Secretary of the Midland Section, and Mrs. Green.

Proposing a toast to the City of Stoke-on-Trent, Mr. Diamond said more than 30 years ago he visited the Potteries on a winter's day. His most vivid recollection was of a yellow smog concealing almost everything. In those days nearly a million tons of raw coal were burned each year for pottery firing.

In 1932, the Stoke Gas Department installed the first modern pottery firing kilns. So great had been the advance that from those small beginnings 25 years ago there were now more than 300 tunnel kilns, of which 120 had been installed since nationalisation.

Mr. Diamond thanked the Corporation of Stoke-on-Trent for its co-operation with the gas industry, and the Lord Mayor for having extended to the visitors the privilege of using at the luncheon one of the finest collections of table ware in the world. It was made available only on rare occasions.

In reply the Lord Mayor said Stoke-on-Trent and the surrounding districts were experiencing a transition from 'The Potteries' of Arnold Bennett's day, to the dream city which was the ultimate goal of every citizen. They must thank the people who produced gas and electricity, among others, whose efforts had subscribed towards clearing their skies of industrial smoke.

New Bill Raises Manx Gas Renewal Fund Limits

AN amending Bill to alter restrictions placed on gas companies with regard to the amount to be appropriated out of revenue for the purchase of renewals has been passed by the Isle of Man Legislative Council.

According to a section of the Gas Regulation Act the maximum amount standing to the credit of such a renewal fund should not at any time exceed an amount equal to one-tenth part of the paid-up capital of the company, including premiums.

But the Douglas Gas Company's renewal fund has reached its limit on this calculation, while their anticipated renewals for the next few years are expected to cost more than double the amount of the fund.

Amendment Requested

The company asked that the Act be amended so as to permit the renewal fund of any gas company to be increased to a maximum of one-quarter of the paid-up capital, and the other Manx companies concurred and supported the proposal though not themselves in immediate need of the increased renewal fund.

The amendment will therefore enable the companies to build up a renewal fund of a more realistic maximum.

COKE FOLLOWS COAL PRICE UP IN N.I.

NEWRY (Co. Down) Urban Council Gas Committee has decided to increase the price of coke by 10s. per ton to offset the recent increase in the price of coal.

Mr. J. Collins, manager, said the coal increase would mean an increase of £1,500 in expenditure by the undertaking. The general revenue account showed a credit balance of £4,043 compared with an overdraft last year of £51.

Prior to the meeting the manager conducted the members on a tour of inspection of the works, and general satisfaction was expressed at the many improvements that had taken place over the past year, particularly in regard to the installation of new plant.

Meanwhile, Coleraine (Co. Londonderry) Borough Council has authorised the Gas Committee to take whatever steps are necessary to meet increasing overhead charges due to the increased price of coal.

When the effect has been calculated the Committee is expected to make a recommendation on an increase in the price of gas.

N.G.B. First-Aid Competition

THE Area first-aid competition of the Northern Gas Board took place at the gasfitting centre, Newcastle-upon-Tyne, on June 29, when six teams from Blyth, Darlington, Sunderland, Stockton, and Newcastle participated. Eliminating contests in the various divisions of the Board had previously been held to decide the teams to take part in the Area final competition.

The winners were the team from the St. Anthony's by-products works, Newcastle, and the Darlington team were the runners-up.

At the close of the competition, which was judged by Dr. A. Roberts of the National Coal Board, and Dr. A. Watson of Newcastle-upon-Tyne, the Challenge Shield and individual prizes was presented by Mr. J. E. White, Deputy Chairman, Northern Gas Board. The winning team will represent the Northern area in the gas industry national first aid competition in London, next October, under the auspices of the St. John Ambulance Association.

OLD GAS METER CAUSES HEADACHE

A MAJOR removal operation took place recently when the old gas meter was removed from a building adjacent to the recreation club of Huntley and Palmers' biscuit factory at Reading. The removal caused quite a headache, as the meter weighed approximately ten tons, and had to be rolled on to a lorry with very little space on either side.

The capacity of this gas meter was 30,000 cu.ft. per hour, and its measurements were 10 ft. long and 9½ ft. in diameter. It was manufactured in 1879.

A modern meter of the same capacity would be about half the size and approximately a quarter of the weight.

Instrument Technology

The Society of Instrument Technology is setting up a special section to cater for the current interest in data-processing systems. This section will begin to hold meetings in London in the autumn.

BRYAN DONKIN OPEN BATHS AT FOUNDRY

Pictured at the recent opening by the Bryan Donkin Co., Ltd., of new baths and showers at their Chesterfield foundry are, left to right, Mr. Alexander Abel-Smith (Vice-Chairman), Mr. R. T. Redfern (Managing Director), Mr. J. Connerton (Commercial Director), Mr. F. B. Holmes (Chairman, B.H.D. Engineers Ltd.), Mr. G. F. Chambers (Tecnhical Director), and Mr. C. W. Ashton (Works Director).

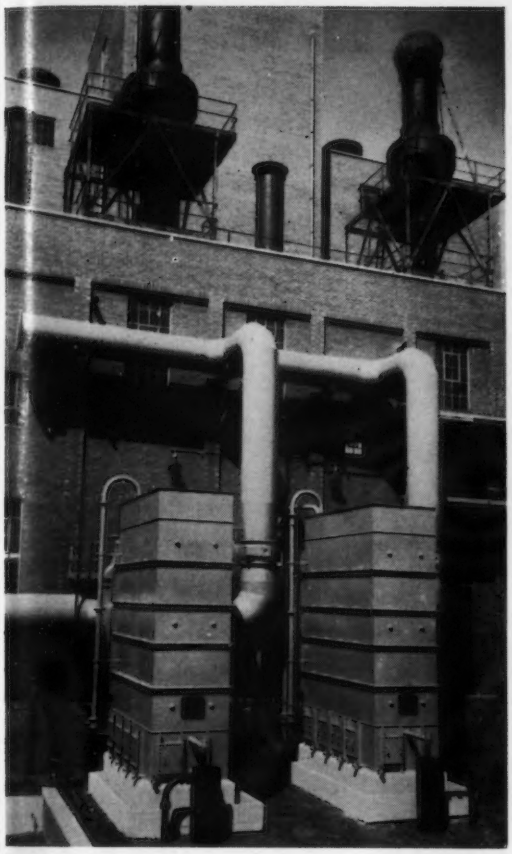
Long Service Awards

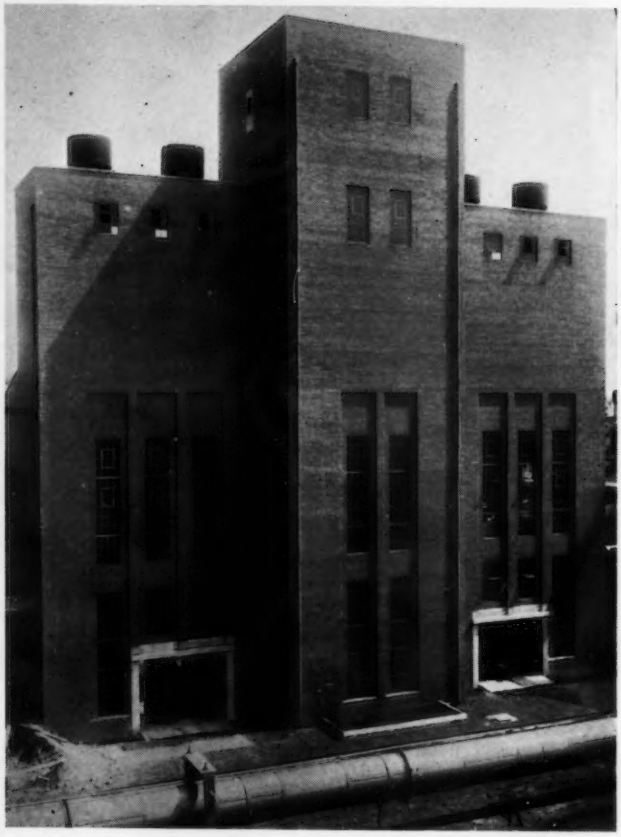
Long service certificates were recently presented to 25 employees of the West Midlands Gas Board, Wolverhampton Division, by Mr. W. R. Branson, Deputy Chairman. Anniversary gifts were delivered to their homes later. Also present were the Division's three B.E.Medalists, Mr. H. Wallett, Mr. G. A. Cooper, and Mr. R. V. Jarvis.

Clean Air Ahead

Leeds City Council has approved a new building by-law requiring that in any new building in the city there shall be provided 'only such appliances for heating or cooking as are suitably designed for burning gas, electricity, coke, or anthracite,' an exception being made where heating is provided by furnaces to which Section 3 of the Clean Air Act applies.

THE 'NEW LOOK' AT PROVAN





Pictured here is the new C.W.G. installation at the Provan Works of the Scottish Gas Board, described in an article in our last week's issue. Top left is the exterior of the East gable, showing gas coolers, mains, and grit arresters, while above the exterior of the new C.W.G. plant house is seen from the front. Left is an interior view showing generators, superheaters, carburetters, and waste heat boilers. Below is a group of some of those present at the opening a week ago today. Mr. H. R. Hart, General Manager, Glasgow and Western Division, Scottish Gas Board, is seen fifth from the right, with members of the Press. The group also includes Mr. W. S. Johnston, Manager, Dawsholm works; Mr. J. A. Ferguson, Controller, Production, Glasgow and Western Division; Mr. Cohen, of Humphreys and Glasgow, designers and builders of the plant; and Mr. S. K. Patterson, Divisional Production Engineer.

Gothic Works, Edmonton, 1957. With a shop area of over 677,000 sq. ft. it is more than ten times larger than in 1899.

GLOVER & MAIN CELEBRATE THEIR DIAMOND JUBILEE

ESTABLISHED in the year of Queen Victoria's diamond jubilee, Glover & Main Ltd., celebrated their own diamond jubilee on July 14.

Formed on the amalgamation of Thomas Glover & Co. Ltd., and R. & A. Main Ltd., Glover & Main Ltd. have grown up with the gas industry and, through the two original companies, has associations which go back to very early days. Thomas Glover & Co. Ltd. commenced the manufacture of gas meters in 1844, trading in those days as Croll & Glover, and by the date of the amalgamation had established a solid reputation both as pioneers and for quality and craftsmanship in the expanding gas meter industry.

Landmarks in Thomas Glovers' history up to that time included the introduction of the first successful dry meter in 1844, using a system of slide valves devised by Thomas Glover himself, and the introduction and patenting in 1894 of the first *in situ* price-changing device for prepayment meters. Both of these basic principles are still retained in the modern dry meter of today.

The original No. 1 Glover dry meter, sold to the old Coventry Gas Company in 1844, was re-purchased by Thomas Glover & Co. Ltd. in 1895, still in perfect working order after completing 52 years of continuous service, and may now be seen at Gothic Works, Edmonton, where it is kept in honourable retirement.

Another highlight was the installation of a 3,000-light meter, the largest meter of its day, at the Great Exhibition of 1851. At this exhibition a prize medal and certificate of merit signed by the Prince Consort were awarded to Thomas Glover for a gas meter exhibited by him.

R. & A. Main Ltd., founded in Glas-

1907—*A popular Main gas fire of 50 years ago—the Melrose. Fitted with a flat top for cooking purposes and Cathedral Gloss side wings.*

1880—*Early Main cooker with front gas rail and barred hotplate—no grill.*

1854—*The No. 1 Glover dry meter was the first to be fitted with Glover slide valves.*

gow in the early 1870's as the Argyle Ironmongery Company, also brought to the new partnership a reputation as pioneers. Entering the gas appliance field when gas for cooking was viewed with great suspicion by the public and even by some members of the medical profession, who thought that 'gas fumes' would contaminate the food, Mains had disposed of this fallacy by enlisting the support of an eminent Scottish chemist, Dr. Stevenson Macadam of Edinburgh, who after exhaustive tests reported: 'The wholesomeness of food cooked in gas ovens must be regarded as beyond doubt.'

This reassurance marked a turning point in the gas appliance industry. From that date the demand not only for cookers but for all types of gas appliances rapidly increased and Mains, with their progressive designs and quality products, were quickly established among the leading manufacturers.

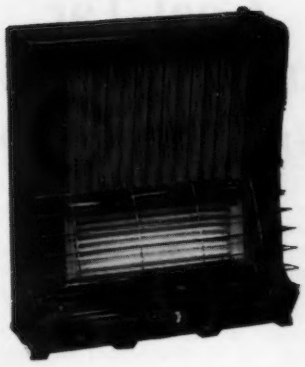
Ambitious Expansion

Immediately upon the amalgamation in 1897 the Board of Glover & Main Ltd., foreseeing the tremendous potentialities of the still young industry, embarked upon an ambitious expansion programme for the companies under its control. A ten-acre site was purchased at Falkirk, and at Edmonton, then but a village eight miles from the centre of London, a second site of 19 acres was acquired. The work of building and equipping new factories on both the sites was immediately put in hand, and in 1899 Gothic Works, Edmonton, commenced operation with a total shop area of 1½ acres, comprising the factories of Thomas Glover & Co. Ltd. and R. & A. Main Ltd. In the following year production also commenced at R. & A. Main's Gothic Works, Falkirk, where a factory covering 2½ acres had been completed.

These were but the first steps in the development of Glover & Main Ltd. which today has a wider interest in the manufacture of gas burning appliances than any other firm in the industry. In 1925, continuing their policy of planned expansion within the industry, the parent company acquired the business of yet another pioneer firm, the Diaphragm & General Leather Co. Ltd., manufacturers of meter leathers, founded in 1847 by Cornelius Turner who introduced the East Indian sheepskin diaphragm, a type which is now generally accepted by the gas industry, both at home and abroad. In the same year the subsidiary company, N.V. Eerste Amsterdamske Gasmeterfabriek 'Glovermeter' was formed to manufacture gas meters in Holland.

During this period of development the cooker side of the business increased so rapidly that, in spite of continual extensions to the new factories, output had to be devoted almost entirely to the production of these appliances. As a result the development and manufacture of water heaters had to be restricted and although production was supplemented from time to time affairs could not be contemplated for an indefinite period.

Consequently, in 1931, the business and production facilities of the Omnia Manufacturing Company was acquired. Even this expansion of the organisation's resources, however, did not suffice to meet the requirements of this side of the business until, in 1934, the company, by then renamed Main Water Heaters Ltd., moved to their present spacious Gothic Works at Croydon where production could be again stepped up.



1957—*Main No. 271 Century heater.*

★

1957—*Main No. 122 Super Century cooker with high-level grill.*

★

1957—*The latest Thomas Glover domestic meter, the D.1, with single slot dual-coin prepayment mechanism which is interchangeable in situ.*

The application of vitreous enamel finishes is an important process in the production of modern gas appliances and constant research is necessary to maintain the progress made since R. & A. Main Ltd. pioneered the first, and then only, all-enamelled cooker in 1927. As a result, Glover & Main take a more than ordinary interest in all matters pertaining to enamels and enamel frit, the basic ingredient of all vitreous enamels.

Seeking to improve still further the quality of the enamels used in the group's factories the parent company launched Main Enamel Manufacturing Company in 1946 for the manufacture of enamel frit and colouring oxides, and a new factory, completed in 1951, was built at Gothic Works, Edmonton, to permit experiment and development to proceed side by side with the chief user company. Today, in addition to meeting all of the Group's requirements for frits and colouring oxides, Main Enamel Manufacturing Co. Ltd. also supplies many other concerns in this country and has a successful and expanding export trade.

South Africa

A further expansion of the Group's interests took place in 1951 with the formation and registration of yet another subsidiary company to produce absorption type refrigerators for operation by town, or butane gas, electricity, or kerosene. In the same year Glover & Main (S.A.) (Proprietary) Ltd. was formed in South Africa to promote the sales of the Group's appliances in that country.

Most recent development in the history of this enterprising and still expanding organisation was marked by the Group's entry into the washing machine field when, in 1955, Glover & Main Ltd. acquired the whole of the share capital of the Morley Products (Padiham) Ltd.

Today the sites at Gothic Works, Falkirk and Edmonton are almost completely built upon—at Edmonton the area of the vitreous enamelling shop alone now exceeds the total area of the original factory—and the parent company, established with a share capital of £250,000, now has an issued share capital of £1,250,000, and controls eight trading companies having a total of seven main factories and seven branch works and offices, employing over 3,000 workers.

In this their Diamond Jubilee year, Glover & Main Ltd. can look back with pride to a record of continuous progress. Pioneering work and manufacturing processes instituted over the years by the companies under its control have contributed a great deal to the success of the gas industry as a whole. The new Super Century cooker, successor to the Century, and the Main Century heater—an effective weapon in combating competition in the space heating field—are both good examples of this work.

Centenary of Coal-Tar Dye Industry

WORK OF SIR WILLIAM PERKIN SEEN IN RETROSPECT

By R. L. Megroz

THE discovery and the exploitation of colouring matter from coal-tar compounds—the first coal-tar dye factory opened in 1857—can be seen in retrospect as an enormously important event in itself, and also as part of a bigger theme of the evolution of the modern industrial age.

Sir William Henry Perkin (1838-1907) died only 50 years ago on July 14, 50 years after he had started the aniline dye industry. In that interval he had lived to see its enormous expansion with the continuous increase of chemical research and finer techniques. Much of the development after Perkin's own retirement in the 1870's from the commercial application of chemical knowledge had been due to the Germans.

Painful Realisation

Indeed, when the first world war started it was realised with painful suddenness that we depended on imports of aniline dyes from Germany, though for years we had exported much of the gas industry's supply of coal-tar to Germany as raw material for her chemists.

While priority was given to a revival of the British aniline dye industry, the Germans, even before the outbreak of war, had been discovering how to become independent of our coal-tar supplies, so extending the range of applied chemistry and production techniques. The ramifications of the new processes were the major cause of Germany's rapid industrial expansion.

Events had merely underlined a statement made by Perkin himself in 1896, that the coal-tar colour industry was unique in being entirely the outcome of scientific research. When Britain lost the lead that Perkin had given the industry it was due to the greater importance attached to scientific research by the Germans—a field that was then increasingly neglected here.

The career of William Henry Perkin, senior (his eldest son bore the same names) illustrates the transition from an early industrial phase to that of the 20th century. While the first phase of the industrial revolution was mechanical, the second was chemical. Britain led the world in the exploitation of coal as fuel (soon to be followed by making it a source of gas), and the development of the steam-engine and many other kinds of machinery.

Perkin recalled that even as a young boy he interested himself 'in several subjects of a mechanical kind, and worked at them to the best of my ability.' In the 1840's mechanical inventions were still very much 'in the air,' but chemistry was beginning to attract attention as something more than the entertaining demonstration of curious experiments.

About 1850 Perkin was shown some chemical experiments by a school friend, the result of which was the beginning of his life-long interest in the work of the chemist. It was about that time that Perkin left his first school and entered the City of London school. He recorded that this was probably the first school in which any experimental science was taught.

The lecturer, Thomas Hall, an old student of the famous German chemist, Hofmann, was one of the masters, and Hall soon made Perkin his lecture assistant. But the new-fangled 'subject' was not allowed to interfere with the school curriculum: The lectures and preparations for them were confined to the dinner interval.

The boy got to know about the Royal College of Chemistry, then in Oxford Street, London, and its Professor Hofmann, and Thomas Hall successfully interceded with the boy's father to let him go to the College. Perkin's father was a builder, and had wanted his son to become an achitect. But now, and still more later, he proved himself wise in his generation, and generously helped him to follow his bent.

Tedious Method

After simple tasks of analysis had been given to the 15-year-old student, Hofmann put him on research work. 'Very curiously,' Perkin recalled, he 'gave me as a subject the hydrocarbon anthracene, or as it was generally called in those days, paranaphthalene. To obtain this, pitch was taken as the starting-point, but as it was found that this method of preparation was a very tedious one to carry out in the laboratory, Hofmann kindly obtained some of the crude product for me from Mr. Cliff, of Bethell's Tar Works.'

Perkin's aim had been to obtain a nitro-compound from anthracene, but during his work he prepared the compound that became known as anthraquinone, and also the chlorine and bromine derivatives of anthracene. His experience proved useful later when working on the production of alizarin to replace the natural dye, madder; but no other progress was then made because the existing formula for the hydrocarbon was incorrect. Not much was yet known about the internal structure of compounds, though interest was growing in the possibility of the artificial formation of natural organic substances.

Perkin at the age of 17 was promoted to be an assistant in Hofmann's research laboratory, and he was greatly attracted by the idea of forming natural organic compounds artificially. Hofmann, though he had only speculations and insufficient factual knowledge to strengthen his recommendation, thought that the artificial formation of quinine was a very desirable aim.

In a report of the Royal College of Chemistry some years earlier he had thrown out this suggestion, adding: 'It is a remarkable fact that naphthalene, the beautiful hydrocarbon of which immense quantities are annually produced in the manufacture of coal gas, when subjected to a series of chemical processes, may be converted into a crystalline alkaloid . . .'—(naphthalidine).

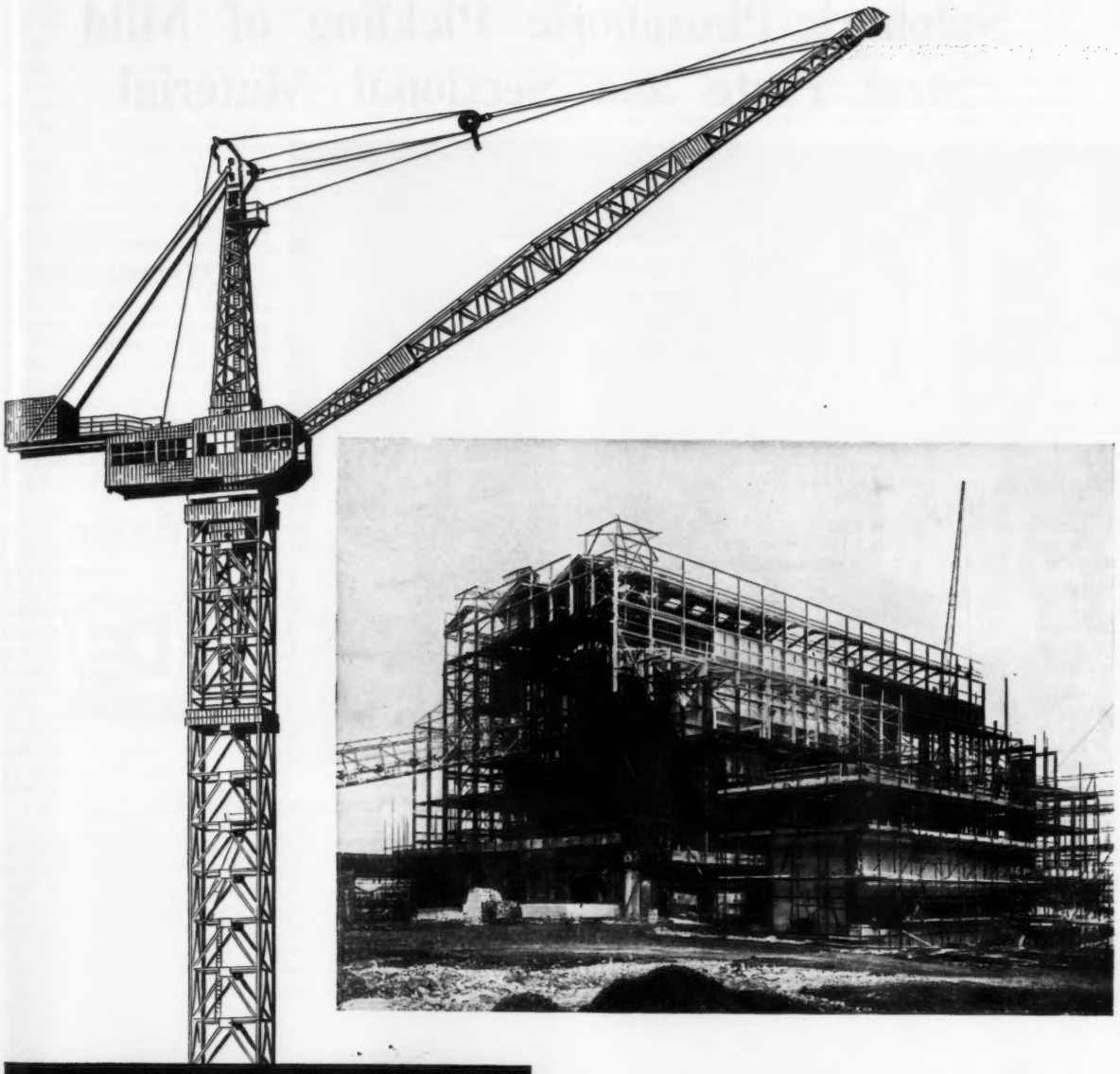
In his hut laboratory at home Perkin set about the rather ambitious attempt to make quinine. He was led by the then popular additive and subtractive method to the idea that it might be formed from toluidine by a combination resulting in 'allytoluidine.' This, he said, 'having been prepared by the action of allyl iodide on toluidine, was converted into a salt and treated with potassium dichromate; no quinine was formed, but only a dirty reddish-brown precipitate. Unpromising though this result was I was interested in the action, and thought it desirable to treat a more simple base in the same manner.

'Aniline was selected, and its sulphate was treated with potassium dichromate; in this instance a black precipitate was obtained, and on examination, this precipitate was found to contain the colouring matter since so well known as aniline purple or mauve, and by a number of other names.'

This autobiographical passage is important in the story because it corrects the over-simplified version of the famous discovery. Though accidental insofar as the experimenter's original intention had been something different, the discovery might not have been made at all but for his alert observation. Moreover, after noting that the new colouring matter did not fade in daylight he had the good sense to ask a big dyeworks for a report on it.

Favourable Report

The report was very favourable, but with the proviso that Perkin would make the dye economically. Familiarity may have obscured the drama in these events. The 18-year-old chemist without hesitation, after getting this report, obtained a patent for his mauve, left the Royal College of Chemistry (much to Hofmann's annoyance) and persuaded his father to build him a small factory at Greenford Green, Harrow. The factory was built in the first half of 1857, and by December of that year Perkin's mauve was being used on a commercial scale at first in silk dyeing.



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In all the centuries of human civilisation there had been no form of colouring matter other than 'natural,' that is of animal or vegetable origin. One of the very old sources, logwood, it is interesting to realise, is again in use for some nylons; but generally speaking the innumerable artificial dyes produced by the industry which stemmed from young Perkin's enterprise are superior in all the desirable attributes of colouring matter.

As for adequate supplies, the demand today could not be satisfied without synthetic products, and even last century serious inroads on food production were beginning when the young coal-tar dye industry broke new ground by making natural colouring matter artificially.

The classical example of the engagement of agriculture in growing the raw material of a dye is madder, from the root of which turkey red or alizarin was obtained. Madder crops occupied large acreages of agricultural land in Europe and Asia Minor.

Patent Registered

In 1869 two German chemists, Graebe and Liebermann, registered a patent for their process of making alizarin from anthracene, and the next day Perkin registered his. The German process, requiring bromine, was not as cheap as natural madder; but Perkin used anthraquinone as a base, and his factory in 1869 started the very first commercial production of alizarin. Perkin's brother, who was an active assistant, toured the tar works to a show the coal distillers how to separate anthracene.

The original factory of the firm of Perkin & Sons had just been replaced by a much larger one, when this new line of activity opened. The Franco-German war broke out soon afterwards and Germany's subsequent victory was unpopular in England, so that a number of German chemists here decided to return home. Among them was Perkin's professor Hofmann, a great teacher as well as chemist.

Interest Sold

Perkin seems to have realised quickly that German competition in the new chemical industry was going to increase and that his own firm would be the first to notice it. He decided to retire from the commercial side of chemistry, and sold his interest in the firm in 1874, being then only 36 years of age.

He had never lost the desire to pursue the work of scientific research for its own sake, which he had voluntarily interrupted in his 'teens when he so clearly saw the industrial value of chemical knowledge and technique. His achievement certainly entitled him to make such a decision, though his retirement as a rich young man marks the start of the phase of growing German competition. From the 1880's up to the first world war German patents and industrial expansion based on coal-tar dyes caught up and passed the British.

When Perkin retired there were eight dyes, the processes for making which had been worked out in his factory; all of them were manufactured there. In quantities, the chief were mauve, Britannia violet, Perkin's green, and alizarin. The others were dahlia, aniline pink, magenta, and aminoazonaphthalene.

Perkin was at first doubtful about magenta, although it soon proved popular for its comparative brilliance. His mauve was more fast and he at first underrated the appeal of brilliance. The Colour Index of the Society of Dyers and Colourists is full of interest regarding all these dyes.

Close Link with Gas

Perhaps there is no need to underline for readers of this journal how much the inauguration of the vast chemical industry by the creation of the aniline dye industry is an integral part of the history of the gas industry itself. At the very beginning, the manufacture of aniline dye emphasised the necessity for tar distillers to supply benzene in greater quantity and in a purer condition than hitherto. Perkin's very first supplies came from the Scottish tar distillery of Miller and Co., of Glasgow. The new industry's raw materials for making mauve were benzene, nitrobenzene, and aniline.

Without attempting a sketch of the identification by various chemists of the few certain compounds then known, which were wanted or soon to be wanted, we should certainly remember that it was Michael Faraday who in 1825 discovered benzene, and that he found it in the liquid obtained by compressing fish oil gas. It was Hofmann who found benzene in 1845 in coal-tar, and prepared from it nitrobenzene and aniline. Faraday's fish-oil was an early rival of coal-gas as an illuminant. That was in the industrial phase connected with the greatest figure in the history of the gas industry—William Murdoch.

This great engineer, inventor, and discoverer pioneered the commercial manufacture of coal-gas, made the first model locomotive, and by a dozen other remarkable inventions established himself as a leader of the new machine age; but he also anticipated the chemical industry in a patent taken out in 1791 for his 'Art or Method of Making (from the same Materials and by Processes entirely New) Copperas, Vitriol, and Different Sorts of Dye or Dying Stuff, Paints, and Colours, and also a Composition for Preserving the Bottoms of all Kinds of Vessels, and all Wood required to be Immersed in Water. . . .'

Though Murdoch was the greater man, he does not stand out as the central figure in the first phase of the industrial revolution as clearly as does Perkin in the second phase. A year before Perkin died he had been knighted, and scientific and industrial delegations assembled from many parts of the world to honour him.

Sons Succeed

He had the satisfaction also of seeing his three sons well known in various fields of chemistry. The second son, Arthur George Perkin, had been responsible for supervising important research work at Leeds University from 1905 to 1907 on indigo, a report of which was sent to the Government of India. Both William Henry (the eldest, who became Waynfleet Professor of Organic Chemistry at Oxford) and Frederick Mollwo Perkin were well known in the academic world of chemistry.

GAS AIDS TIN RESEARCH

The Tin Research Institute, which uses considerable quantities of gas in its research and development work, recently threw its laboratories open to the public. Pictured above are some of the Institute's gas-heated industrial-size hot tinning baths which can accommodate 5 gal. milk cans and other large articles, and which were seen by visitors. The Institute has recently developed a new machine for the continuous casting of bronze tubes and rods which incorporates a gas-heated run-dish. The process was demonstrated and a film was shown illustrating its use.

From the Continental Gas Press . . .

Determining Particles in Suspension in Gas

THE determination of the concentration of particles in suspension in coke oven gas is important because they frequently lead to trouble and breakdowns, writes A. Haarmann in the March 15 issue of *Das Gas- und Wasserfach*. Four methods have been applied so far—flushing with liquor, electric precipitation, photometric determination, and separation by impingement and/or filtration. None of these methods has been wholly satisfactory and a sub-committee of the Steinkohlenbergbauverein in Essen has endeavoured to perfect a new analytical method which is free from the errors of the old methods.

As preliminary tests had shown that a simple extraction filter thimble retained less of the finest fractions of the suspended particles, a thimble of three layers was proved to be fully satisfactory for gas flows from 35 to 50 cu.ft. per hour. The thimble is surrounded by a heated jacket in order to prevent condensation of water vapour. The adsorption vessel is first dried at 95°C. and weighed. It is then connected to the gas mains as shown in the illustration (Fig. 1).

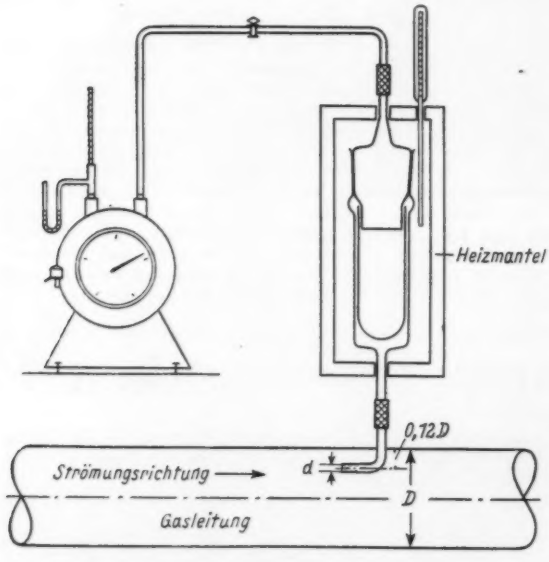


Fig. 1. Heizmantel, heated jacket; *strömungsrichtung,* direction of flow; *gasleitung,* gas main.

After it has adsorbed, say, 500 milligrams, it is dried again at 95°C. After three minutes, air is pumped through at the rate of 0.035 cu.ft. per minute and the vessel is weighed when cold. The drying and weighing process is repeated until the readings are nearly constant. This method has been officially recommended after satisfactory completion of a great number of tests.

Underground Gasification

NOW nearing completion, the Soviet Union's first gas turbine power plant to be driven by gas produced by the underground gasification of coal lies in the neighbourhood of Tula not far from the river Schat from which it takes its name—the Schat Power Works. In this a technical experiment has been realised—the production of underground-gas electricity, says an article in the May 10, issue of *Das Gas-und Wasserfach*. Air will be blown into part of the 50-metre-deep holes bored to ignite the coal, the oxygen from which, assisted by the ignition device will produce the source of heat in the coal. Carbonisation will take place in the heated coal, the gas produced passing through the offtake borehole to the gas-piping leading to the power works. This underground carbonisation can be controlled from above ground: If the temperature of the gas rises, cooling water can be led in through the piping to the boreholes.

This first industrial, underground gas-producer possesses 100 boreholes and pipelines of a total length of 20 km. The plant will be moveable, the piping following the underground fire to a new position according to the working of the coal.

Made in the Leningrad Metal Works, the gas turbine installation is described as a 'machine-combination.' It is a coal-mine, a gasworks, and a power station combined in one. Of special importance is the utilisation of new steels claimed to be extremely heat-resistant. The parts exposed to heat—the cylinder, the conducting apparatus, the rotors, and the blades—are made of these steels.

Only a third of the personnel required to operate a normal steam-power plant is needed for the installation, while the first-cost of power production is claimed to be lower than in the case of a normal steam turbine.

Phenol Extraction by Colorimetry

THE Pott-Hilgenstock process is used exclusively in the coke oven plants of the Ruhr for the extraction of phenol from liquor, writes E. Beier in the March 15 issue of *Das Gas- und Wasserfach*. Two central extraction plants recover the phenol from the phenolised caustic soda produced in the individual works. At most of the coke oven plants, the phenol content of the caustic solution is determined by bromination and iodometric titration of the excess of bromine. The disadvantage of this method is that the phenol concentration may appear to rise when in fact it has a tendency to drop.

It is claimed that the colorimetric method, based on the chain reaction of phenol with a p-nitranilin diazo compound, gives a better picture of the relative saturation in the alkali scrubber, that it takes only a fraction of the time of the former and that the consumption of chemical reagents is negligible. The illustration (Fig. 2) shows the universal colorimeter which works on the differential principle, one of the basins (4) containing clean water and the other (5) the coloured liquor. The iris diaphragm (8) is adjusted until the galvanometer reads zero. The sensitivity of this method is much improved if monochromatic light, which absorbs the colouring matter, is applied.

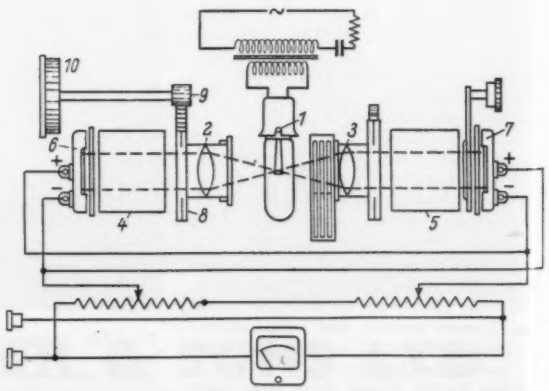


Fig. 2. 1, electric lamp bulb; 2 and 3, lenses; 4 and 5, basins; 6 and 7, selenium photo-cells; 8, iris diaphragm; 9, gearing; 10, knurled wheel.

HEAT DEMANDS OF U.S. PAPER AND TEXTILES INDUSTRIES PROVIDE CHALLENGE FOR GAS

A DUAL challenge to the gas industry lies in the recent developments by the paper and textiles industries with new requirements for higher temperatures and accurate temperature controls. Gas and gas-designed equipment offer the most practical means for meeting those requirements.

Equipment manufacturers and the industrial engineers of the gas companies have been busy developing and selling applications to increase mill outputs with improved products, G. R. Van Kampen, Sales Manager, Red-Ray Manufacturing Company, told a conference of American Gas Association's industrial and commercial section. Textile and paper machinery builders now furnish machines with gas equipment.

Remarkable changes are taking place in the characteristics of textiles and paper. Fabrics might well not have been near a loom and paper may resemble cloth or leather. Processes of manufacture and the uses for gas are extensive and varied. In the manufacturing processes of textiles and paper, drying and heat-setting are among the most important.

The dryer section of a paper machine may vary from a hundred to several hundred feet in length; the costs may be in hundreds of thousands of dollars or in millions. In view of the importance of drying and the costs involved, this process receives much attention. Reductions in equipment required or increases in production from existing equipment can be extremely profitable, Mr. Van Kampen emphasised.

Processing Temperatures

Textile and paper machinery in America used steam as the only heat source, until quite recently. As gas became more generally available, a variety of gas equipment was developed to provide the industries with greater economy and flexibility. That does not mean that all large boilers have been eliminated. However, it is no longer necessary to fire large boilers and deliver steam to remote parts of mills for vats or curing ovens. Gas not only delivers heat where and when it is needed, but also provides the required processing temperatures.

One large and progressive paper manufacturer has developed a new material with a thread base and plies of cellulose wadding. It can be made to conform to many specifications of strength, appearance, texture, water and flame resistance. Threads in the base can be rayon, nylon, or glass. The material cuts like paper and can be sewed on a machine; it can be glued or fastened by heat-sealing. The dividing line between textile and paper is becoming less distinct, Mr. Van Kampen commented.

Twistless yarns are another interesting development. While this is new and presents problems, it offers promise of advantages. Entirely new fabrics may result from twistless yarns.

Tenter frames for drying and width-setting are important pieces of equipment in mills where finishing is done. They range from 40 ft. to 100 ft. in length and many are open. In some, old steam pipes and coils have been replaced by gas burners, usually radiant. Located under the frames, these burners contribute to higher and more economical drying speeds. Many modern tenter frames are enclosed, making them ovens, in effect. Carefully designed distribution systems force heated air against the cloth surfaces. When it is not desirable to stretch and hold cloth to a definite width, multiple-pass dryers are used. Cloth is suspended from bars which travel through the dryers. Or, cloth passes back and forth over a series of rolls.

Gas burners are ideal for enclosed tenders and drying ovens. Burner capacity can be planned to provide the heat necessary for high speed drying and the temperatures necessary for setting thermoplastic materials and resins. Gas burners in this equipment, properly installed and safeguarded, give the required heat, are readily controlled, and safe. While ovens and enclosed tenters can achieve excellent results with air at closely-controlled temperatures, heat transfer by means of air is slow. In typical ovens, one-third of the travel is utilised in heating the material to the drying or setting temperature. Many mills pre-heat just ahead of the main ovens in small special ovens, operated at high temperatures.

There is danger of over-heating cloth if machines are stopped with cloth in the pre-heaters. However, radiant burners provide this initial heating in very limited space and minimise the danger.

Steam cylinders are widely used for drying and sometimes for simple water removal or to obtain an ironing-effect. Invariably, speeds of steam dryers can be increased by the addition of radiant burners, located under the first dryers and directed toward the cloth for maximum efficiency. Heated air and hot products of combustion flow upward, further increasing the drying. Very often fuzz, sizing, or various coatings cause trouble by adhering to the surfaces of the dryers. Burners applied to the material before it reaches the dryers will reduce this sticking.

Large-diameter drums with thick walls are heated effectively by gas burners within the drums. Automatic throttle control maintains uniform surface temperature and it is possible to maintain higher temperatures than are possible with steam at the pressures usually available in the mills.

Calender rolls and embossing rolls present problems in many mills. Various types of burner have been installed within the rolls and in some cases applied to the outer surfaces. Neither location is ideal. The inside diameter usually is so small that it is difficult to install burners with the necessary capacity and to maintain adequate exhaust, with uniform temperature across the face of the rolls. External applications are restricted by limited space and danger of damaging adjacent parts.

Roll heating is a serious problem in many textile mills. The rolls, and machines of which they are parts, usually were designed for use with steam which will not provide the heat necessary for higher speeds and the use of heat-setting materials. An effort is being made to encourage co-ordinated research in the development of rolls and burners.

Tremendous Requirements

Paper mills have tremendous heat requirements to prepare the basic materials and to evaporate about 2 lb. of water for each pound of paper produced. In the drying sections of paper machines, wet paper passes over a series of steam dryers varying from 24 in. to 60 in. in diameter and from 50 in. to 200 in. or more in width. Typical machines include 50 to 100 dryers. At present, there does not seem to be a practical substitute for steam dryers in most of this drying, Mr. Van Kampen believes.

Extra tonnage is extremely profitable to paper manufacturers, as fixed costs do not increase proportionately when production is increased. Adding steam dryers is expensive. They require floor space, additional boiler capacity, and often necessitate shut-down periods. The problem is solved by installing radiant gas burners so that heat is applied directly to the paper at the wet-end of the machine. They may be located just ahead of the first dryer or under or at the sides of the first several dryers. Such burner installations increase production by 10 to 15%. A few thousands of dollars invested in burners will increase production by 10% or more on a machine worth hundreds of thousands. Paper companies find such installations profitable.

Interest has been aroused in the paper-making industry by the use of radiant burners for 'hot press.' Here, burners are installed for direct heating above the wet web of paper between the first and second presses. Higher temperature and lower viscosity result in increased mechanical water removal as the web passes through the press. One mill reports an increase of more than 5 tons per day as a result of 'hot press' operation.

Paper converters do not have the problem of evaporating large volumes of water, as in paper-making. Their general requirements are to dry coatings or glue and to set resins. They encounter frequent trouble due to sticking on dryers or rolls used to transport the web. Many have solved the sticking problem by applying radiant heat to the paper ahead of contact with the first dryer or roll. At the same time, some drying takes place; the balance is done by heated air that may be waste heat from the burners. Well-designed systems, Mr. Van Kampen concluded, using a combination of radiant and convected heat, are providing new high speeds and economies.

From the Presidential Address to the Northern Junior Gas Association, Tynemouth, June 20

The Increasing Importance of Redheugh Works

By J. C. GRAHAM

GATESHEAD

THE Tyneside Division of the Northern Gas Board is served by five production stations producing coal gas from continuous vertical retorts, intermittent vertical chambers and horizontal retorts, and all these stations are now closely interlinked by an internal grid system. Four of these works are sited on industrial Tyneside and the largest of these is the Redheugh works situated on the south side of the river in the centre of a large and expanding industrial area. This works was originally opened on October 24, 1876, and in those days the extensive nature of the new works, which occupied some 25 acres, was apparently considered quite exceptional. The foresight of those responsible for the original planning, however, is deserving of the highest praise, as the position and extent of the site has allowed progressive development to proceed in step with ever increasing demand.

In the early 1920's four horizontal retort houses were in operation, having a total capacity of some 9 mill. cu.ft. per day, with four manually operated water gas plants capable of producing approximately 4 mill. cu.ft. per day, available to meet peak winter requirements. It was during the latter part of this period, however, that a policy decision, involving the purchase of crude coke oven gas, was taken and this resulted in a temporary halt to further works developments.

Well Placed

By virtue of its position on the south side of the River Tyne, the works was well placed to take supplies of crude coke oven gas as they became available, from ovens erected adjacent to the collieries in the North Durham coalfields, to meet the growing demands of the steel industry. Three separate supplies were received over a period of some 11 years and in two cases progressive development at the ovens has resulted in additional supplies becoming available. Details of these supplies are as follows:—

1. 1929—10 mill. cu.ft. per day from Derwenthaugh coke ovens—three miles from the works. This has continued at between 10 and 12 mill. per day to the present time.
2. 1937—3¼ mill. cu.ft. per day from Monkton coke ovens—5½ miles from the works. Only the balance of this supply was received at Redheugh, after the requirements of the Jarrow works had been satisfied.
   1939—¼ mill. cu.ft. per day extra from Monkton coke ovens.
   1956—6½ mill. cu.ft. per day extra from Monkton coke ovens.
   As from November 1956 the whole 10.5 mill. per day has been purified at the coke ovens and boosted direct into the distribution system.
3. 1940—2 mill. cu.ft. per day from Norwood coke ovens—one mile from the works.
   1941—1 mill. cu.ft. per day extra from Norwood coke ovens.
   1946—1.5 mill cu.ft. per day extra from Norwood coke ovens.
   1947—1.0 mill. cu.ft. per day extra from Norwood coke ovens.

A new battery of ovens was put into commission in 1947 replacing the old battery which had reached the end of its useful life.

With the introduction of the first supply in 1929 works production virtually ceased and activities were largely restricted to dry purification and distribution processes. Three out of the four retort houses were closed down, leaving only a section of the No. 3 retort house, which had been rebuilt in 1921, in operation. By this time Nos. 1 and 2 retort houses were considered redundant, but No. 4 house was fit for further service and was maintained as a reserve unit. This position was further strengthened in 1929 by the installation of a new automatic carburetted water gas plant of 1.7 mill. per day capacity.

During the war years, therefore, the output from Redheugh was made up as follows:—

Coke oven-gas—free from ammonia, naphthalene and benzole

Consett—10-11 mill. cu.ft. per day at approximately 500 B.Th.U. per cu.ft. crude.

Bowes—1-3 mill. cu.ft. per day at approximately 525 B.Th.U. per cu.ft. crude.

Priestman—2-4.5 mill. cu.ft. per day at approximately 450 B.Th.U. per cu.ft. crude.

Coal Gas

Nos. 3 and 4 retort houses—6.5 mill. cu.ft. per day maximum winter production.

Water Gas

One automatic and four manual plants—6 mill. cu.ft. per day maximum winter production.

In the year 1945, the Redheugh works, with an annual output of 7,934 mill. cu.ft., was supplying 61.6% of the area of what then constituted the Newcastle and Gateshead Gas Company and 25.5% of this total was made in the works. Since the end of the war, sales in this area have increased by 49.3% from 12,879 mill. cu.ft. in 1946 to 19,238 mill. in 1956, and in this latter year the Redheugh works was still contributing 56.2% of the total requirements of what is now the Tyneside Division of the Northern Gas Board with an annual output of 10,811 mill. cu. ft., of which works production had risen to 49.7%.

It is interesting to note that the maximum daily throughput from the works in 1946 and 1956 was 27.5 mill. and 41.2 mill. cu.ft. per day respectively. It will be readily appreciated that in meeting these requirements, a very considerable increase in all spheres of productivity has been necessary and a substantial programme of replacement and extension, involving a high degree of mechanisation, has been carried out in all departments. This programme has required careful planning and execution so as not to interfere unduly with the continual stepping up of annual output, which has been urgently required. Some of the main features of this modernisation programme have been as follows:—

In 1955 a 4.5 mill. cu.ft. per day horizontal retort installation was built in the existing No. 1 retort house. It replaced plant of approximately 1.8 mill. cu.ft. per day capacity. The new retorts, 24 in. by 18 in. by 22 ft. 6 in. long, are arranged in two vertical tiers of five retorts per setting. The main features of interest in this installation which is fitted with Congdon standpipes and Le Fleuve coke conveyor system, are (1) flat arch construction; (2) deep inbuilt producers; and (3) electronically-operated retort house governors.

Adequate Temperatures

The producers, which are 3 ft. 9½ in. wide and 15 ft. 1 in. deep and fitted with curtain arches, provide very good operating conditions and no difficulty has been experienced in maintaining adequate temperatures for 12-hour carbonising with fire cleaning limited to once per 24 hours. The producer efficiency is increased by the preheating of the primary air from approximately 60°F. to 240°F. by drawing the air required from the non-producer side of the setting through two 6 in. by 5 in. flues situated underneath the regenerators. The ashes removed from the producers are passed over a double deck vibratory screen. These screens provide a simple and efficient means of recovering the bulk of the combustible material from the ashes. The over 3¼ in. and under 1 in. material is diverted into the overhead ash hopper, while the intermediate fraction falls into a separate overhead coke compartment. The coke recovered,

which amounts to approximately eight tons a day, has been found quite suitable for use in producer and water gas plants.

The control unit for each retort house governor consists of three main items: (1) The sensing unit, (2) the electronic unit and (3) the series wound split field motor which operates the butterfly valve on the foul main. Briefly, the sensing unit transforms variations in pressure in the foul main into electrical impulses which, after being rectified, are passed out as variable D.C. control signals. These signals are passed through the electronic amplifier to the thyratron unit which in turn acts upon the split field motor, causing it to rotate in either direction according to the control signal received. These governors, which require only a minimum of routine attention, have now been in operation for 2½ years and have functioned most efficiently controlling pressures to 1/100 in. W.G.

In 1946 a 3 mill. cu.ft. per day automatic C.W.G. plant was installed; in 1951 another was installed, this time of 4.5 mill. cu.ft. capacity, and another of that capacity was introduced in 1955. At each stage the necessary condensing plant, turbo driven air blowers, and exhausters were also installed. The latter two units, having 10 ft. generators, replaced the four manually operated sets and were housed in the same building, thus increasing the output per sq. ft. of ground space by over 100%.

Time Saving of 90%

New tar separators and filter chambers were installed to treat the effluent from the 13.5 mill. cu.ft. per day installation and these were formed in reinforced concrete below ground level. The renewal of the coke filters was originally carried out by manual means but in order to obviate this very dirty work a system of steel framed, mesh bound cages has been devised together with the necessary lifting and traversing structure. By this means the cages, complete with fouled coke, are removed mechanically and transferred to a loading point, where the coke can be tipped direct into lorry. Spare cages allow the replacement of coke to be effected in a minimum of time and a time saving of 90% has been achieved.

Dismantling of redundant atmospheric condenser and tower scrubbers allowed the progressive installation of the following plant to meet coal gas requirements: (1) Duplicate sets of 6 mill. cu.ft. per day electrostatic detarrers; and (2) duplicate sets of 6 mill. cu.ft. per day static NH_3 washers. Duplicate sets of 6 mill. cu.ft. per day electrostatic detarrers were also installed for the treatment of carburetted water gas.

Probably the most difficult problem during these years of rapid expansion was due to the inadequacy of the dry purification plant and the problem was aggravated during the winter periods, when all aavilable plant was in production, by the wide variation in coke oven inputs which quite frequently occurred.

During the period under consideration, three old sections of the water lute type which had been erected in 1896 were dismantled and seven new sections installed, thereby increasing the total capacity from 27 mill. to 42 mill. cu.ft. per day. The new units have been standardised in units each of 3 mill. cu.ft. per day. All are of welded steel construction with oxide arranged in four layers and provided with the maximum flexibility of operation by the fitting of divided flow valves. Four of these sections, complete with elevators and overhead conveyors, have been built on the same site and in the same building as that previously serving the old water lute installations and have increased the throughput per square foot of ground space in this area by 100%. Mechanisation has been applied extensively in this department. With the aid of the latest combination of breakers, disintegrators, conveyors and mechanical shovels, the preparation of material either for re-use or sale is carried out simultaneously with emptying.

The method of preparing material for re-use was shown in the investigation on the performance of oxide purifiers by Dr. L. A. Moignard to restore the activity and texture of the oxide most effectively: A dust suppressing chamber which was designed by the Deputy Chairman, Mr. J. E. White, is fitted to the outlet of the disintegrating plant and this has satisfactorily overcome the dust nuisance previously associated with dry oxides. In order to effect a thorough degree of mixing of the various gas streams, they are fed to the inlet end of a horizontal mixing chamber before passing forward through a common outlet to the storage holders.

The continually rising demand for steam resulted in increasing difficulty in maintaining adequate steam pressures from the hand-fired Lancashire boilers and it was decided to replace these by water tube boiler installation. This contract was commenced in April, 1947, and the boilers first went into commission in December, 1948. The new boiler house was centrally situated with regard to the heaviest steam consuming plant, e.g., gas compressors, C.W.G. plant, exhausters, etc. At the same time a progressive programme of electrification of the smaller steam-driven machines, especially those furthest removed from the boiler house, was effected and with redundant steam services cut back, transmission losses have been steadily reduced.

The new installation consists of two tri-drum water tube boilers each of 30,000 lb. per hour normal capacity. The boilers are fitted with forced draught travelling grate mechanical stokers and are specially designed to burn coke breeze with an efficiency of 75%.

One of the most interesting features of this installation is the provision of full automatic control. This system of control is air operated and is arranged to control the air supply to the furnace from the main steam pressure, and to regulate the fuel supplied to the boiler from the steam flow/air flow relation of a recording meter.

This automatic control system has been fully justified and constant steam pressures have been maintained with widely varying load conditions. Over the succeeding years it has operated with a minimum of attention and at negligible cost, and has given a degree of control which could not have been obtained by manual means.

During the period under consideration, both the original sulphate of ammonia plant and the benzole plant have been dismantled and replaced by modern units in the existing buildings. The former is a 7-ton-a-day unit (capable of being increased to 12 tons a day) producing Grade 1 salt. The plant has been able to operate at an improved load factor by utilising crude liquor from the Elswick works, situated on the opposite bank of the river. The transfer by barge is an economical proposition as the barge previously arrived empty to take on crude tar for the by-product works. In addition to the normal bag loading of sulphate, equipment has been installed for bulk loading to meet the high demand for this type of delivery.

The benzole plant, which has a capacity of 6 mill. cu.ft. a day, is of the active carbon type and the whole process is automatically controlled. In addition to removing benzole and naphthalene, this plant also reduces the organic sulphur by some 72% and assists in maintaining the sulphur content of the mixed gases supplying the district in the region of ten grains per 100 cu.ft.

To ensure that coke supplies are of the standard of cleanliness and sizing required to meet present-day needs a new coke grading plant of 30 tons per hour capacity has been erected. The design of the general layout takes into account the good overseas market for the horizontal type of coke, the somewhat variable nature of the demand and the necessity of meeting rush orders occasioned by shipping delays. The project was only made possible in the first place by the diversion of the River Team which previously, by its winding passage, had divided the site. Following the filling in of the old river bed, however, access to an additional stocking ground of 7,100 tons capacity has been made available adjacent to the screening plant, which has been provided with all facilities for road and rail loading, together with sidings for marshalling approximately 800 tons in wagons.

Vibratory Debreezing

By means of a 24 in. belt conveyor system, fitted with automatic weighing machine, coke can be transferred either to the screening plant or to the stocking yard, where arrangements are such that both graded and ungraded coke can be stored. The main grading screens are of the flat reciprocating type design to pass progressively sized coke into R.C. bunkers.

Facilities for bag filling, storing and loading have been provided and the outlets from the bunkers containing 1a, 2 and 3 sized coke are fitted with vibratory debreezing screens. The fitting of self-lubricating idlers and bearings of dust proof ball-bearing type reduce routine lubrication to a minimum, while the design of wearing plates and screens is such that replacements can be carried out both easily and speedily.

Simultaneously with works expansion and modernisation,

the distribution system in the Division has been developed to provide low, intermediate and high pressure mains. Bearing in mind also the development of the internal Divisional grid system, it will be readily understood that a comprehensive replacement and reorganisation of the works distributing machinery has been necessary. The above requirements have been satisfied by the installation of: (a) Duplicate sets of electrically driven fan boosters—1 mill. cu.ft. per hour each—37 in. W.G. pressure raise; duplicate sets of electrically driven positive boosters—350,000 cu.ft. per hour each at 5 lb. per sq. in. pressure; and two sets of steam driven compressors—total capacity 500,000 cu.ft. per hour at 30 lb. per sq. in. pressure.

With the expansion and modernisation of the works, the increase in power requirements have been substantial and have been met by high voltage supplies from the grid through sub-stations positioned at appropriate points. The original sub-station was supplied at 6.5 kV and this has been augmented by two further sub-stations at 6.5 kV and 20 kV respectively. These sub-stations, which are all interconnected and fitted with necessary safeguards are, in the case of the 6.5 kV supply, fed from two directions of a ring main, while the 20 kV is fed from a different source, thus providing good cover against power failure.

Water Conservation

The conservation of water has been a matter for continuous thought and attention during the development period, and apart from boiler feed requirements, which are supplied from condenser outlets, all other water requirements on coal gas, water gas, benzole and sulphate of ammonia plants are now operated on recirculating systems. Works drains have also received particular attention and all main drains have been fitted with coke filter chambers to ensure the necessary cleanliness of the effluent at all times. In view of the tidal nature of the river at the point of outfall, and bearing in mind the low level of the works in relation to the river, the two main outlets have been fitted with automatic pumping units to guard against works flooding.

Good roads are essential in all works for obvious reasons and at Redheugh this important matter has not been neglected.

The works, while supplying its full share of base load requirements of the Tyneside Division, has also had to develop an increasingly high degree of flexibility, not only to meet the normal variable and peak load requirements, but also in meeting conditions brought about by the increased quantity of coke oven gas now being fed into the East Coast gas grid. These conditions become particularly difficult during the summer months and especially at week-ends, Bank Holidays and during the staggered industrial holidays.

Further Flexibility

To give further flexibility during this period, partial coal gas firing has been introduced into the base load retort house. A simple system is employed whereby a governed and metered supply of crude gas is fed into each producer at a point immediately above the clinkering door lintel.

Nos. 3 and 4 retort houses are now nearing the end of their useful life and in order to assist in meeting immediate future demands of the Division, and especially the variable load requirements at a relatively cheap cost and without the use of coke, oil gas plants are to be installed. Demolition of a section of one of the retort houses is at present in progress preparatory to the erection of two 3 mill. cu.ft. per day units, and these are scheduled for production in July, 1958.

On completion of this stage of development, works output will be made up as follows:—

Coke oven gas—Consett	11.5	mill. cu.ft. per day.
Priestman	5.5	,, ,, ,, ,,
Coal gas	4.5	,, ,, ,, ,,
Producer gas	1.5	,, ,, ,, ,,
Oil gas	6.0	,, ,, ,, ,,
Water gas	13.5	,, ,, ,, ,,
Total	42.5	,, ,, ,, ,,

Having traced the main developments of the Redheugh works to the present day, it will be seen that it continues to expand, and to take up a position of increasing importance in the Tyneside Division.

The Structural Use of Reinforced Concrete in Buildings

THE revised edition of the Code (CP-114: 1957) issued by B.S.I. in 1948 deals with reinforced concrete design and construction as applied to beams, slabs, columns, flat slab construction and walls and bases in buildings. It also deals with floors, roofs and stairs, which were previously the subject of separate sub-codes.

The present edition incorporates some important changes and developments, which should lead to increased economy and freedom in design. The recommendations concern materials and strength requirements; also permissible stresses of steel and concrete, which have been increased wherever this could be done with safety.

The design of mixes to a specified strength requirement is now provided for, and for nominal mixes somewhat higher permissible stresses are allowed where the cube strength requirements for the particular mix are consistently exceeded.

Methods for assessing the bending moments and other stresses in the various members, and the permissible loads on columns are included; and there are general formulæ applicable to any type of steel.

Calculations for beams, slabs and eccentrically loaded columns on a load factor basis are now permitted. Recommendations are made on the practical aspects of concreting, formwork and the bending and placing of reinforcement. Some guidance on the fire resistance of certain types of reinforced concrete construction, based on the recommendations of the Joint Fire Research Organisations, is given in an appendix.

The Code, which is illustrated, concludes with a comprehensive alphabetical index. Copies of this Code may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1. Price 10s.

Amendments and Addenda to I.G.E. Safety Recommendations

THE Institution of Gas Engineers has lately published fresh amendments and addenda to their Safety Recommendations.

DIa., addendum to DI., draws attention to the availability of indicator tubes containing potassium pallado-sulphite which speeds up the detection of carbon monoxide. Full details of the tubes will be found in Leaflet No. 7 (carbon monoxide) issued by the D.S.I.R.

An amendment slip for sticking to G.17 comments on the different names under which a relief valve recommended by this Section for a Wiggins holder is referred to. The official name to be used in future is 'gas volume relief valves.'

P9a., amendment to P9, replaces section 18 (k) dealing with the purging of a stocking tower containing full frames of spent oxide.

M4b, addendum to M4, makes recommendations about the provision of auxiliary charging holes on C.W.G. plants to make access easier for inspection and repairs.

M6 (ammended) is a completely new section to replace the present section M6 and deals with safety measures to be applied to platforms, ladders and stairways providing a means of access to plant.

ESSO PETROLEUM CO., LTD., announces that supplies of refinery gas are now being made from the Esso refinery, Fawley, to the Southern Gas Board's works at Southampton, where it will be reformed to make it suitable for domestic and industrial use.

This follows the agreement which was signed last year calling for a supply of 17 mill. therms a year of refinery gas for a minimum period of ten years. The arrangement will save the Gas Board 115,000 tons of coal each year.

Trade News Supplement

Measuring Benzole Contents of Coal Gas

NEW METER INTRODUCED BY HANOVIA

A BENZOLE meter which will give a rapid and accurate measurement of the amount of benzole present in rich coal gas, or left in the gas after the extraction process, has been developed by Hanovia (Lamps Division of Engelhard Industries, Ltd.) in conjunction with the research department of National Benzole, Ltd.

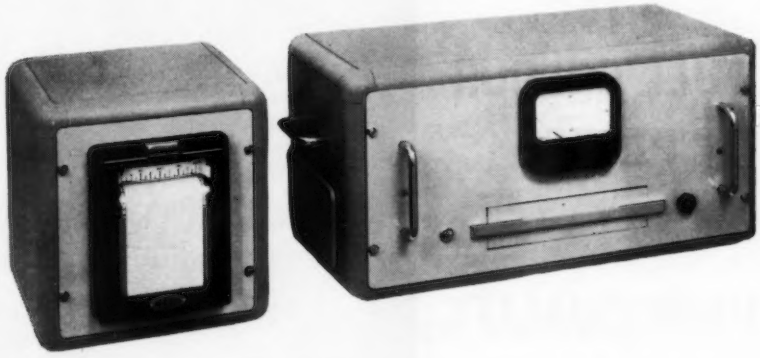
This meter—see illustration—will measure 0.1 to 6.0 grams of benzole per 100 litres of coal gas. However, it can be adjusted when required to show a full scale reading for 4.0 grams per litre of gas. It will respond almost identically to benzene, toluene, or xylene, and will also respond in varying degrees to other important vapours with high absorption in the U.V. region around 2.537 A.U. The vapours of such compounds as trichloroethylene, methyl ethyl ketone, and styrene will show varying degrees of absorption to short U.V., and the meter will also prove useful for estimating a number of other organic compounds in the vapour state.

The operation of the unit depends on the characteristic absorption values of certain organic and inorganic compounds in vapour form to selected ultra-violet wavelengths. It comprises a sensitive photoelectric photometer in which a fixed length gas cell is interposed between a low pressure mercury vapour tube—substantially monochromatic—and a photoelectric detector with a quartz envelope. The photoelectric cell is arranged to unbalance a dual pentode bridge circuit when the transmission path is influenced by the presence of benzole. The meter mounted on the front panel indicates the state of unbalance in the bridge circuit and thus the amount of benzole.

The drive supply to the ultra-violet source and to the bridge circuit is stabilised against changes of voltage and frequency of the supply line. Once set up, the equipment may therefore be considered as stable over considerable periods of time. All circuit adjustments are preset except for the nominal supply voltage selector and the remote/internal indicator selecting switch, and only require checking at about four-monthly intervals, depending upon the amount of use the instrument receives.

In operation, it is recommended that the instrument be sited, switched on and allowed to reach thermal stability over a period of about three or four hours. The indicator should then read zero, and the input gas line can then be connected and a waste line provided. The inside of the absorption cell is nickel-plated to withstand any corrosive effects from the coal gas passing through the cell, and the presence of other constituents in coal gas does not interfere with the normal operation of the meter. If the H_2S content of the gas is high, it may be necessary to interpose a small absorption tower between gas supply and meter.

A compact, portable table-unit, the Hanovia benzole meter will find a wide range of applications, particularly in the spot measurement of benzole contents in coal gas, or in conjunction with a suitable recorder for continuous operation.—*Hanovia (Lamps Division of Engelhard Industries, Ltd.), Slough, Bucks.*



Nothing to go wrong; easily seen : New dancing ball flow Indicator

A RELIABLE device providing a visual check on the flow of air, gas or cooling water is the new 'Arkon' ball flow indicator. It comprises a die cast body over which is a small toughened glass dome held in position by a screw cap.

In the flow region of the body is the seat for a loose ball. In case of no flow the ball rests on the seat, but as soon as the water, air, or gas begins to flow the ball is lifted off and appears under the dome, higher up or lower according to the rate of flow.

This dancing movement never fails. If the flow stops the ball sinks out of sight again. The movement of the half white ball is so definite that it cannot be mistaken, even in a bad light. It can be seen easily from across the room and from all angles. With only one moving part—the ball—there is nothing to go wrong.

Minimum flow required for water is ½ pint per minute upwards; for air and gas, ½ cu.ft. per minute upwards.

The 'Arkon' ball flow indicator can be fitted at any point in the circuit in a horizontal pipe line. Connections are ½ in. (female) B.S.P.T.

It has many applications in industry and is being fitted to air compressors, bearings, boiler circulating and feed pumps, condensers, distillation plant, liquid vats, oil coolers, oil engines, radiators, etc.—*Walker, Crosweller & Co., Ltd., Cheltenham, Gloucestershire.*

British-Invented Gas Plant Aids East-West Trade

THE Power-Gas Corporation, Ltd., in association with licensees in Germany, Didier-Werke, A.G., has received an order for two units of Segas plant, each of 30,000 cu. m. per day for the gasworks, Rostock, Eastern Germany.

Although Didier-Werke has already installed Segas plants in Western Germany at Hameln and München Gladbach, this is the first order for this type of plant to be received from Eastern Germany. The fact that a considerable part of the plant is to be supplied from the Stockton works of The Power-Gas Corporation, Ltd., is an indication of the improved trade relations between Eastern Germany and Great Britain.

The Segas catalytic oil-gas process is capable of handling a wide variety of feedstock; in the case of Rostock the feedstock is a brown coal tar. The residual tar can be handled easily and sold or burnt as fuel.—*The Power-Gas Corporation, Ltd., Stockton-on-Tees.*

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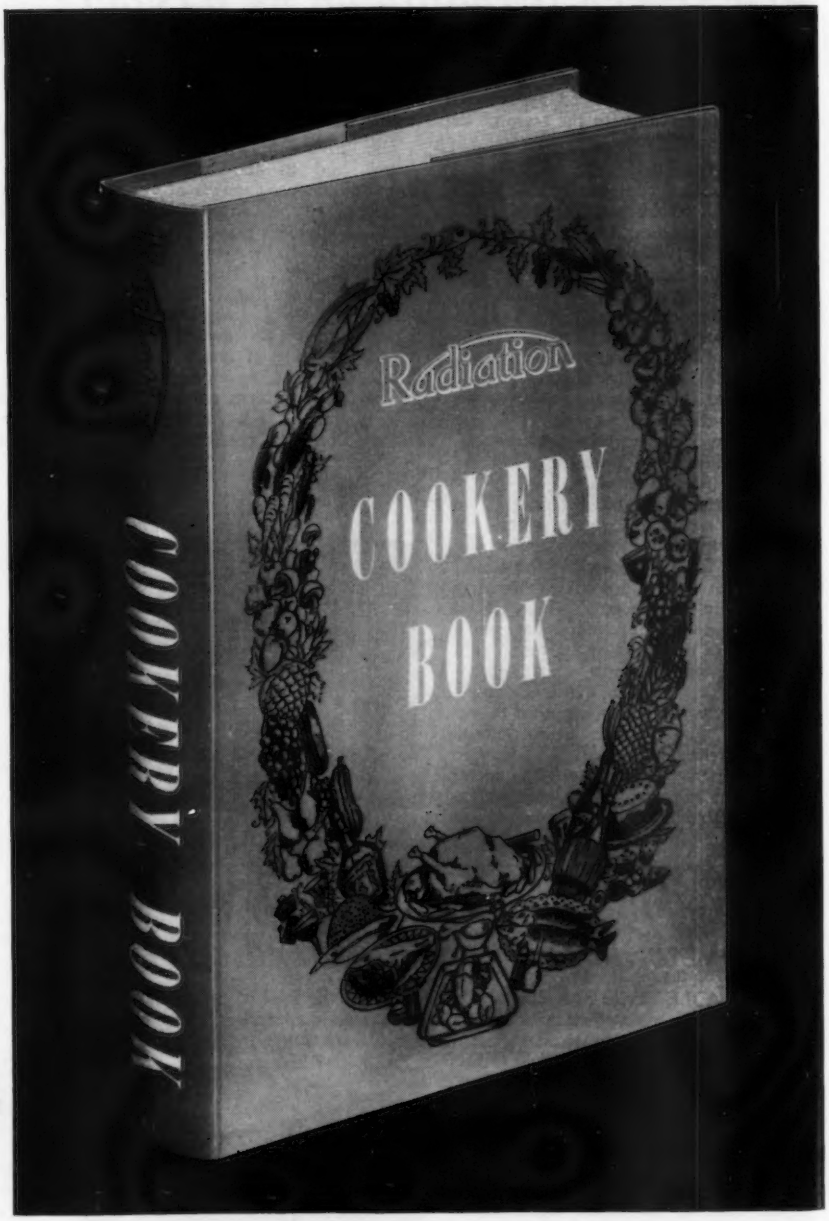

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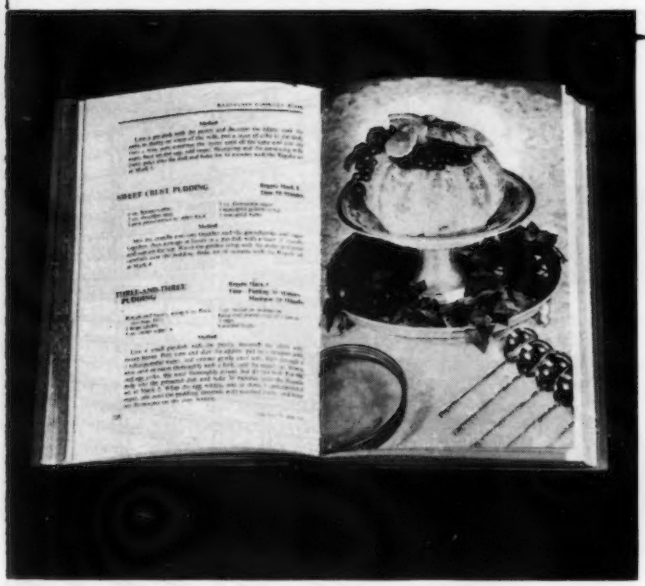

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Perl Controls Develop New Banana Ripening Room Heater

PERL CONTROLS, LTD., have developed a new banana ripening room heater, the Perl Safeguard Unit, No. 122, consisting of a simple direct-fired heater casing containing flat flame burners, and a type No. 31 Junopilot flame-protection set. It is used in conjunction with a perl type No. 51 direct acting room temperature regulator which has been used for some years in banana ripening rooms.

The purpose of the unit is to improve combustion of town gas for heating, in that the whole of the very small amount of fresh air which is allowed to enter these rooms is passed around the burner flames, ensuring that these burn in an atmosphere free from vitiation.

Apart from the more efficient use made of the gas, the hazards of incomplete combustion are avoided. In the unlikely event of the flames becoming extinguished for any reason under these improved conditions, the flame-protection control will shut off the gas supply, preventing any collection of unburned gas in the room.

The heater casing is 4 ft. 6 in. high 10 in. wide, and projects 6 in. from the face of the wall. A front outlet of large area is provided at the top, and a similar front air inlet at the bottom, both covered with expanded metal panels to prevent ingress of foreign matter. The heater thus recirculates the air in the room, at an appreciable velocity owing to the chimney effect of the casing, at the same time introducing a percentage of fresh air to support combustion.

Thermostatic control of the heaters is intended to be of the modulating type as opposed to the 'high/low' control adopted hitherto. When room temperature dictates, however, the main gas will shut completely off so that the continuously burning pilot burner will give no more overshoot of temperature than would be obtained with the turned-down main burners formerly used.

The ¼ in. B.S.P. type No. 31 Junopilot valve set provided shuts off both the main and the pilot gas supplies on flame failure. A draught shield of perforated metal is fitted to screen the pilot burner from up draught through the heater.—*Perl Controls, Ltd., 672, Fulham Road, London, S.W.6.*

£135,000 Tower Box Purifier

WORK will start at the end of this year on a £135,000 tower box purifier to be installed at Worcester gasworks of the West Midlands Gas Board. Henry Balfour & Co., Ltd., have received a contract to erect this plant.

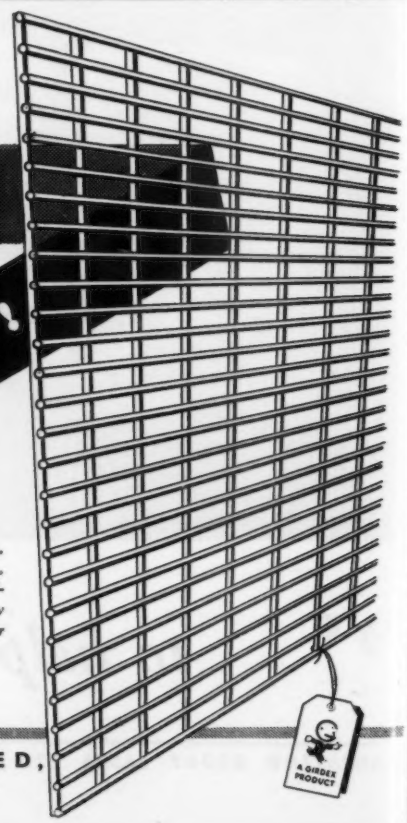
Initially the plant will have a total oxide capacity of 28,400 cu.ft., and the gas throughput will be 4 mill. cu.ft. per day. Eventually it is hoped to double this throughput by adding six further oxide-holding trays to the east tower. The installation is scheduled to be completed by the end of 1958.

The company have already installed tower box purifiers at the Southall, Bow Common, Rotherham and Beckton gasworks.—*Henry Balfour & Co. Ltd., Durie Foundry, Leven, Fife.*

New Process Control Gear

ETHER, LTD., the firm which recently introduced a completely new form of indicating temperature-controller, the Transitrol Series 900, employing a light-sensitive transistor and eliminating the need for thermionic valves, magnetic amplifiers, and oscillator circuits, are about to market an entirely new range of solenoid valves expected to be unequalled for performance and reliability.

By the end of the year a comprehensive range of entirely new types of Ether process control equipment will be available, and to meet the expansion of business which will ensue, a further factory of 60,000 sq. ft. is now under construction.—*Ether, Ltd., Birmingham.*



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Control Valve of Unique Design is Put on the Market

A VALVE of unique design, the P.V.120, has been put on the market by PressureVac, Ltd. It is of the butterfly type but gives a positive pressure-tight closure at working pressures of up to 5 lb. per sq. in. It can be operated pneumatically or hydraulically and the speed of valve operation can be adjusted from extremely fast to slow in either direction.

It can be supplied with a position controller which will allow both flow control and the pressure-tight shut-off features to be utilised. Another interesting application is its use as a pressure relief valve.

By maintaining a suitable air pressure in the air operating cylinder which corresponds to the pressure desired to be maintained in the ducting, the valve will remain closed. However, should pressure in the ducting increase it will overcome the maintained pressure in the air cylinder and the valve plate will lift off its seating. When pressure in the ducting falls to a figure below that maintained in the air cylinder the valve will again operate to the closed position.

Constructed in high duty cast iron, flanged to British Standard Table 'A,' the valve is substantially lighter and less cumbersome than many other conventional type valves, and is available in 12, 16, 20, 24, 30, and 36 in. bore.

In the closed position the valve plate is at right angles to the axis of the valve body. During opening the plate is first lifted off its sealing ring and then rotated through 90° to the fully open position by means of a patented lever mechanism of extreme simplicity and efficiency.

All bearings in the valve are made of PTFE and the seal ring is supplied in various grades of material to suit the particular duty the valve is required to handle. A wide range of gases and vapours can be controlled at temperatures up to 500°F.—*PressureVac, Ltd., 175, Piccadilly, London, W.1.*

Improved technique for V-belt construction is introduced

THE British Tyre & Rubber Co. Ltd., have introduced 'grommet' construction in their range of high test V-belts—a development which brings advantages in performance and efficiency not hitherto available to users of V-belts in the U.K. The advantages of 'grommet' belts have already been well established in America.

A 'grommet' is an endless spirally-wound rope-like structure made from high-tensile rayon cord. The new BTR V-belts incorporate two such units symmetrically spaced on the pitch line of the belt and completely surrounded by a cushion of resilient and heat-dissipating rubber. The outer cover consists of a double-ply of rubber impregnated fabric specially designed and woven to provide maximum abrasion resistance and high frictional grip on the driving faces of the pulley.

One of the most important advantages of the 'grommet' construction is that, notwithstanding its greater strength, it is extremely supple. This means that the 'grommet' absorbs less energy and creates less internal heat when flexing round the pulley than conventional cord or fabric reinforcement.

The spirally-wound construction of the new tensile members ensures that each thread bears an equal share of the load (a vital factor in V-belt performance) and, as there is no ply-upon-ply of fabric reinforcement to stiffen the belt, there is a reduction in bending losses and an increase in flex life.

'Grommet' belts stretch less and maintenance costs are consequently minimised. —*British Tyre & Rubber Co., Ltd., Herga House, Vincent Square, London, S.W.1.*

Hop Sacks Made into Coke Bags

After two years of experiment and with the close co-operation of the purchasing and coke sales departments of the North Cheshire Group of the North Western Gas Board, the Stockport sack manufacturers, Norman Willitts (Sacks) Ltd., have perfected a 'new' bag for coke delivery manufactured from once-used hop sacks.

The finished sack is a handsome job when printed and has been proved to be a money-saver.—*Norman Willitts (Sacks) Ltd., 45, Waterloo Road, Stockport, Cheshire.*

Precision Metal Cutting Shears Marketed Here

THE Bewege precision hand lever shears, illustrated here, is now being marketed in the U.K. by J. C. Neville, Ltd., offer several advantages.

When cutting sheet metal to pattern, the metal sheet is placed in the shears in such a way that the pattern comes exactly under the cutting edge of the upper knife, which is immovable. In operation, the lower knife, which is movable, rises. Through the circular movement of the locking lever, the material is locked against the upper knife. This prevents the material moving or becoming distorted.

The double-lever to which the lower shear is attached prevents any sideways movement of the shear. The thinnest foils, as well as sheet metal up to 4 mm. thick can be cut cleanly. Distortion even of thin sheet metal cannot occur. As material is locked in position, it is possible to cut narrow strips of only a few mm. width from whole length.

Also marketed by this Company are the Kibler-Universal metal cutting hand shears, available in two sizes.

Their sturdy body is made of drop forged (no casting) material of high resistance. On account of the parallel flats at the bottom of the shears the tool can be fixed in a vice. By this combination of shears together with a vice most favourable working conditions are obtained.

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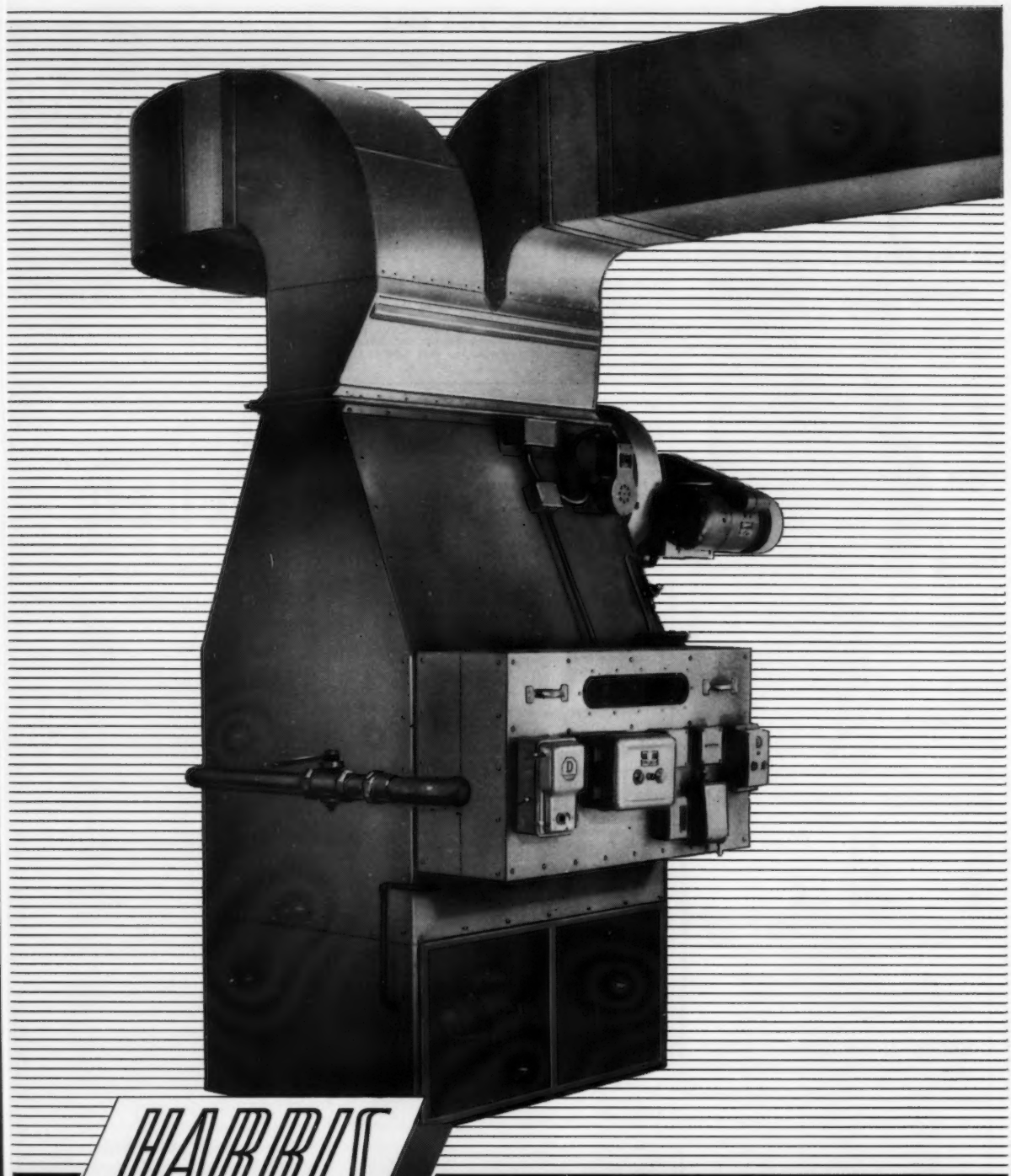

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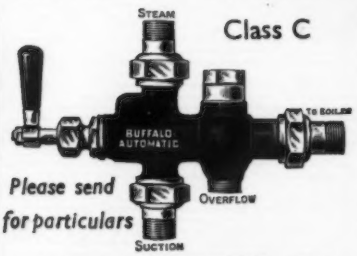

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APPOINTMENTS VACANT

£1,500 per annum commencing salary plus commission. Man or woman with merchanting outlook and experience in the chemical trade. Preferably technical knowledge but this not essential. Applicant would be required to travel abroad and if possible to speak French and German. Apply: No. 327, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

MINISTRY OF POWER: GAS EXAMINER. The Civil Service Commissioners invite applications from men and women for a pensionable post in Scotland (Stirling area). Age at least 26 on July 1, 1957. Candidates must hold a Higher School Certificate with passes in Physics, Chemistry, and either Pure or Applied Mathematics (all as principal subjects), or an equivalent qualification in these subjects, or possess either the Associate Membership Examination Certificate including Gas Engineering (Manufacture) or the Higher Grade Certificate in Gas Engineering (Manufacture) of the Institution of Gas Engineers, or have had at least five years' experience in official testing of gas for calorific value, purity and pressure.

Salary: Minimum £840 (women £768). Men's maximum £1,075. Women's salary being improved to reach equality with men's by 1961. Exceptionally starting salary above minimum Promotion prospects. Full particulars and application forms from the Civil Service Commission, Scientific Branch, 30, Old Burlington Street, London, W.1, quoting No. S4732/57/7. Application forms to be returned by August 8, 1957.

NORTH WESTERN GAS BOARD

WIRRAL GROUP
PRODUCTION ENGINEERING ASSISTANT

APPLICATIONS are invited for the above pensionable post. The commencing salary will depend upon qualifications and experience and will be within Group A of the National Salaries Table, viz., £1,075-£1,195 p.a.

The person appointed will be responsible to the Group Production Engineer for matters concerned with the technical control of existing plant, and investigation and development work on any technical processes associated with gas production, for which purpose the resources of the Central Laboratory will be available to him.

The scope of the position is more fully described in a leaflet available to those who are interested and this, together with an application form, which must be returned not later than Wednesday, August 14, 1957, may be obtained from the General Manager, Wirral Group, North Western Gas Board, Hind Street, Birkenhead.

NORTH EASTERN GAS BOARD

HEAD OFFICE
ENGINEERING ASSISTANT

APPLICATIONS are invited from suitably qualified persons for the position of ENGINEERING ASSISTANT in the mechanical engineering section of the Chief Engineer's Office at the Head Office of the Board.

The salary will be within Grade A.P.T. 9 (Provincial 'A') (£795-£895 per annum) of the Salary Scales agreed by the National Joint Council for Gas Staffs.

The duties include, either in whole or in part, the preparation of schemes, estimates and specifications for mechanical handling and steam raising plant. The successful candidate will be required to carry out steam investigations on Works and should be familiar with all aspects of steam distribution and utilisation.

Candidates must have good Drawing Office and general engineering experience. Preference will be given to candidates possessing a Higher National Certificate, or the equivalent.

The successful candidate will be required to pass a medical examination and to join the Board's Staff Pension Scheme.

Application forms may be obtained from the Chief Engineer, North Eastern Gas Board, Head Office, Bridge Street, Leeds, 2, and should be returned to him not later than July 31, 1957.

J. C. GARDNER,
Secretary.

FORD MOTOR COMPANY, LTD., have a vacancy for an ENGINEER, age 26-35, in connection with a modernisation scheme for their Coke Oven Plant. Applications should have had drawing office experience in the design and layout of modern coke ovens and by-product plant in an engineering capacity at such or in the chemical engineering industry. This is a well paid post with participation in a generous non-contributory pension scheme. Please send details of experience and qualifications to Salaried Personnel Department, Dagenham, Essex, quoting reference MEP.

NORTH THAMES GAS BOARD

SENIOR DRAUGHTSMEN are required in the Chief Engineer's Department at Westminster, S.W.1, for:—

(1) The design and layout of general process plant and all associated structural steelwork.
(2) The design and detailing of civil engineering, foundations and structural work mainly in reinforced concrete associated with gas manufacturing plant.

Candidates should preferably be Corporate Members of the Institution of Civil, Structural or Mechanical Engineers.

Starting salaries within the range £890-£1,050 per annum according to age, qualifications and experience.

The successful candidates will be required to join the Staff Pension Scheme.

Applications, giving age and full particulars, should be sent to the Staff Controller, North Thames Gas Board, 30, Kensington Church Street, W.8, quoting reference 666/314.

CITY COUNCIL OF SINGAPORE

SHIFT ENGINEERS—GAS DEPARTMENT

APPLICATIONS are invited for appointment of TWO SHIFT ENGINEERS, Gas Department, on agreement for two periods each of three years' resident service.

Qualifications:—Ordinary Grade Certificate of the Institution of Gas Engineers in Gas Engineering (Manufacture) OR Institution of Gas Engineer's Technological Certificate in Gas Manufacture. Well experienced in all aspects of gasworks manufacture and purification plant. Experience in the control of automatically operated carburetted water gas plants and/or Catalytic oil gasification plants is essential. Must be capable of controlling operational labour and maintaining efficient production. Must have held reasonably responsible and similar posts in a medium sized gasworks elsewhere.

Basic salary within scale $695 per month × $45 to $1,280 per month ($1 Malayan = 2s. 4d.). The commencing salary offered is between $695 and $875 a month depending on experience. Expatriation and Variable Allowances are also payable. Total emoluments including current allowances on salaries of $695 and $875 per month respectively are equivalent to £1,386 and £1,638 per annum for a single man, £1,512 and £1,764 per annum for a married man with no children, and £1,551 and £1,879 per annum for a married man with one or more children.

In addition, a gratuity equivalent to 20% of basic salary is payable on satisfactory completion of each period of three years' resident service.

Partly furnished quarters at a rental of 12½% of basic salary provided if available. Air passages paid including family subject to certain limits.

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Further details from the Council's London Agents: Messrs. Allen & Williams, 1, Victoria Street, Westminster, London, S.W.1. Closing date for full applications in DUPLICATE, Tuesday, August 13, 1957.

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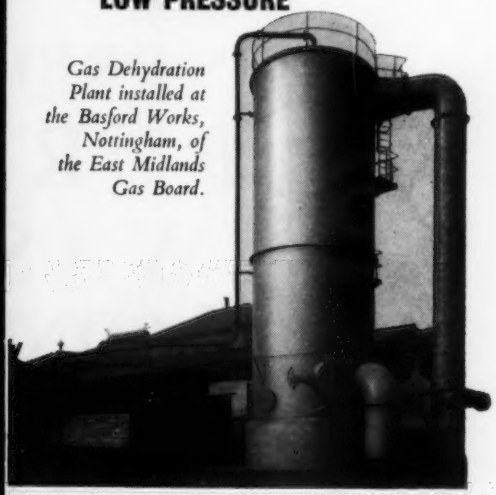

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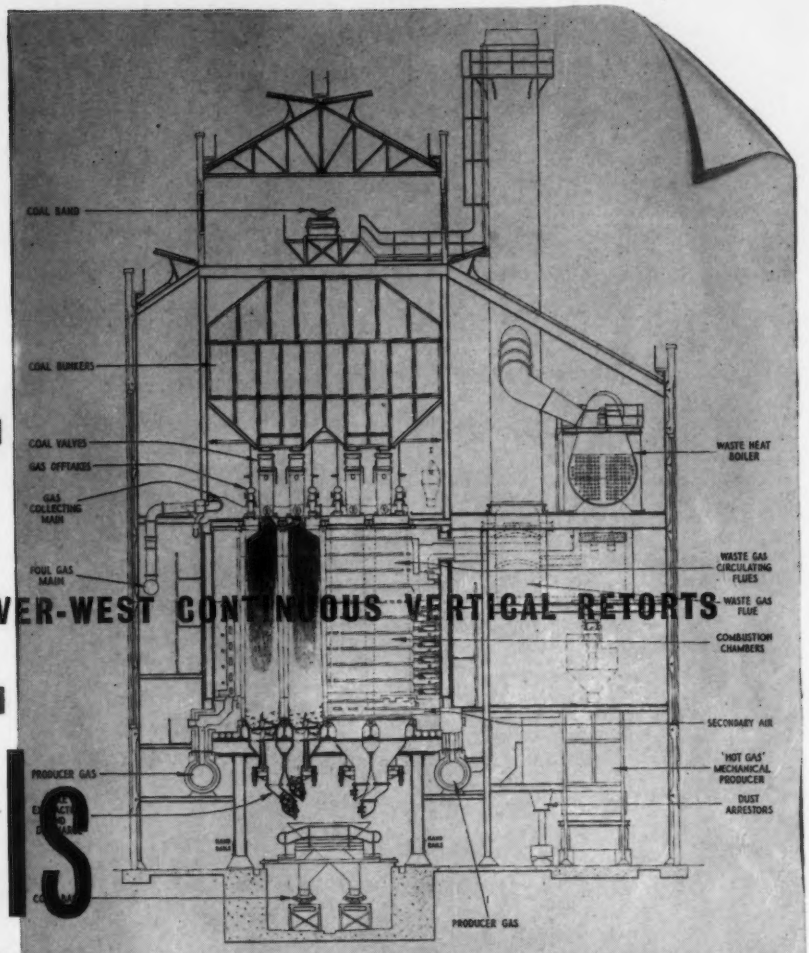

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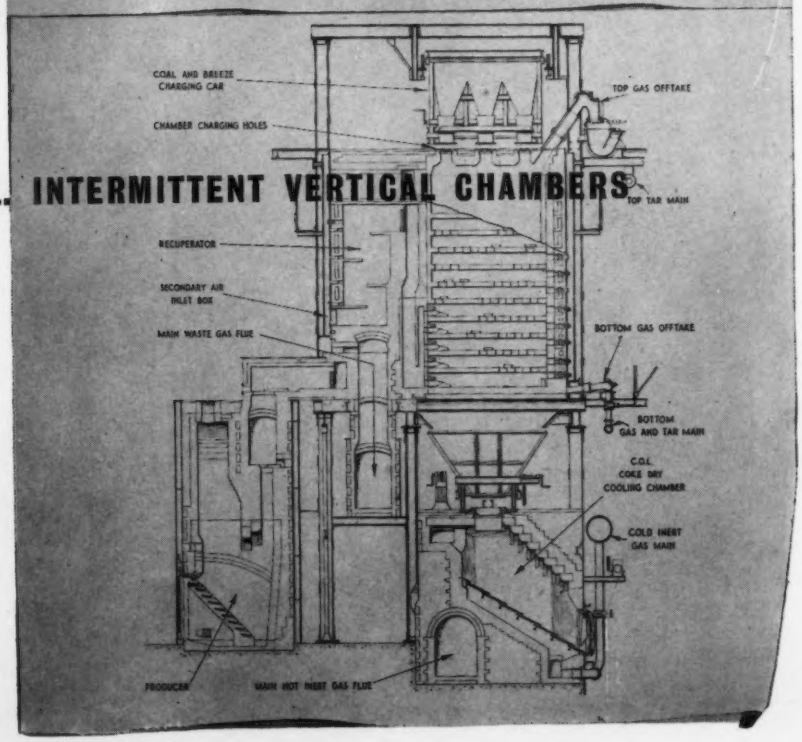

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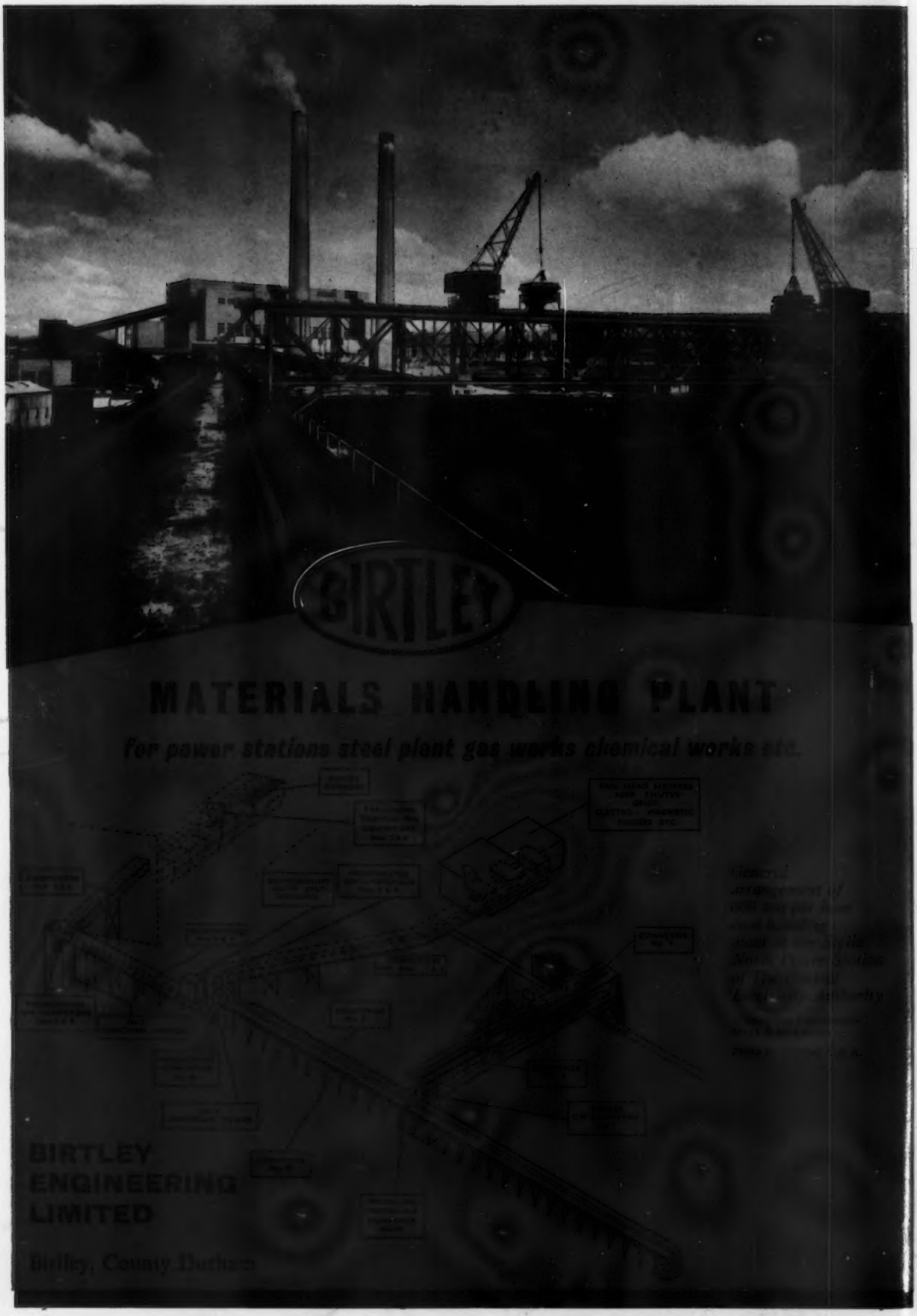
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